Mining

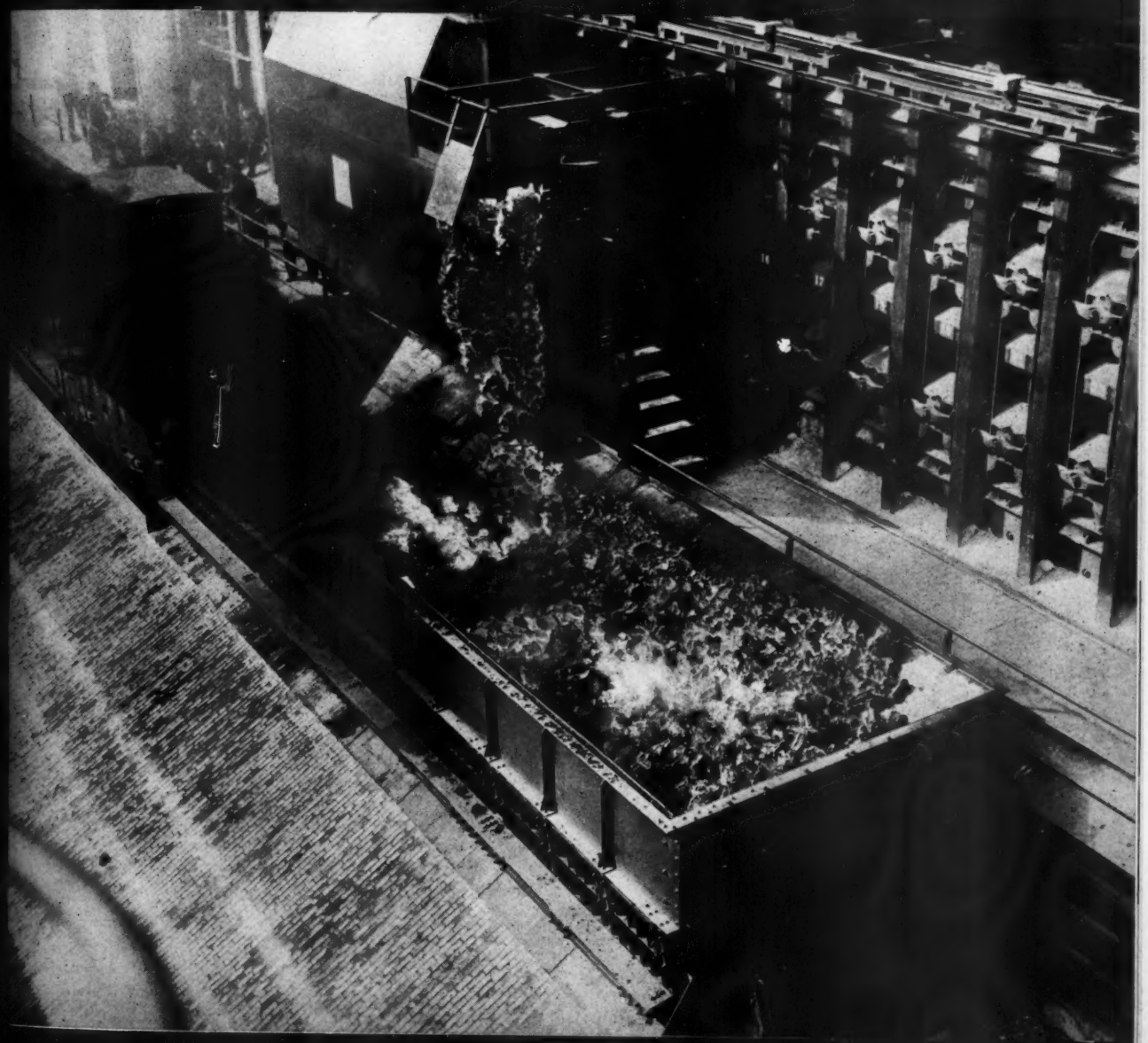
AMC

★

JUNE 1951

★

CONGRESS JOURNAL



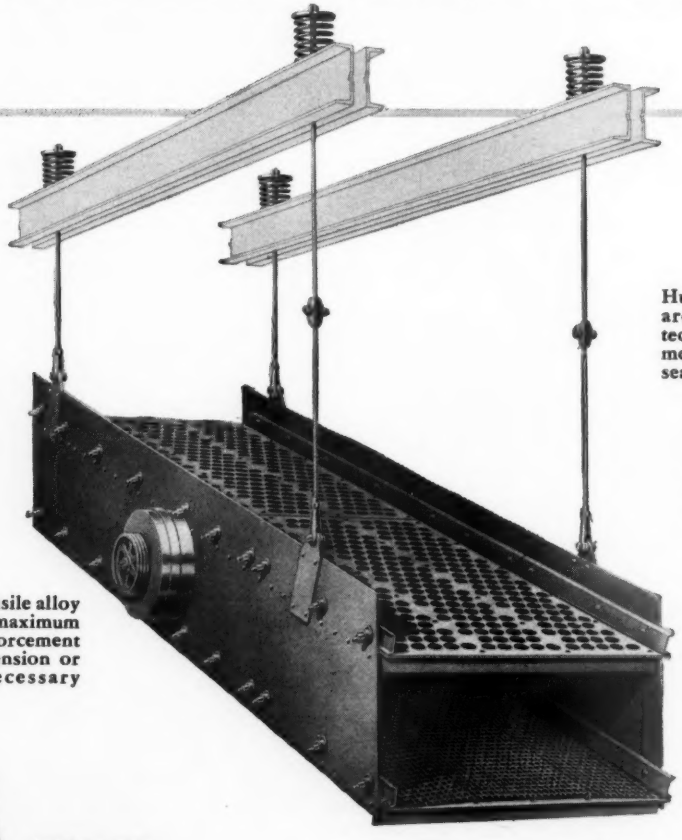
For accurate sizing...
For thorough rinsing...
For rapid dewatering...

the BETTER WAY is with CA

Concentric Action Vibrating Screens

No matter what your screening requirements — Link-Belt CA Vibrating Screens offer top efficiency. Self-aligning vibrator mechanism imparts a smooth, positive, circular motion to every square inch of every deck. Lively tumbling action gives each particle maximum opportunity for sizing, washing or drainage.

There's a standard size CA for almost every job — 3 x 8 to 6 x 16 ft. . . . single, double and triple deck . . . suspension or support mounted. Remember, when it comes to materials handling, profit-wise operators come to Link-Belt.



Two-bearing vibrator has constant bearing loads — no shock from impact of feed.

Unbalanced weights easily adjusted to amplitude of highest efficiency.

Screen box of high tensile alloy steel plate provides maximum strength. Solid reinforcement at vibrator and suspension or support insures necessary rigidity.

Husky roller bearings are completely protected from dust and moisture by labyrinth seals, steel housing.

Centrifugally-actuated, unbalanced weights eliminate excessive vibration in accelerating and decelerating.

Screen cloth is securely tensioned and clamped over rubber supports, can be quickly changed.

WRITE FOR BOOK 2354 for complete layout data

LINK-BELT

VIBRATING SCREENS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa.) Offices in Principal cities. 12.425

SOUND TONNAGE TALK

It's How Many Tons You Load CONSISTENTLY That Counts!

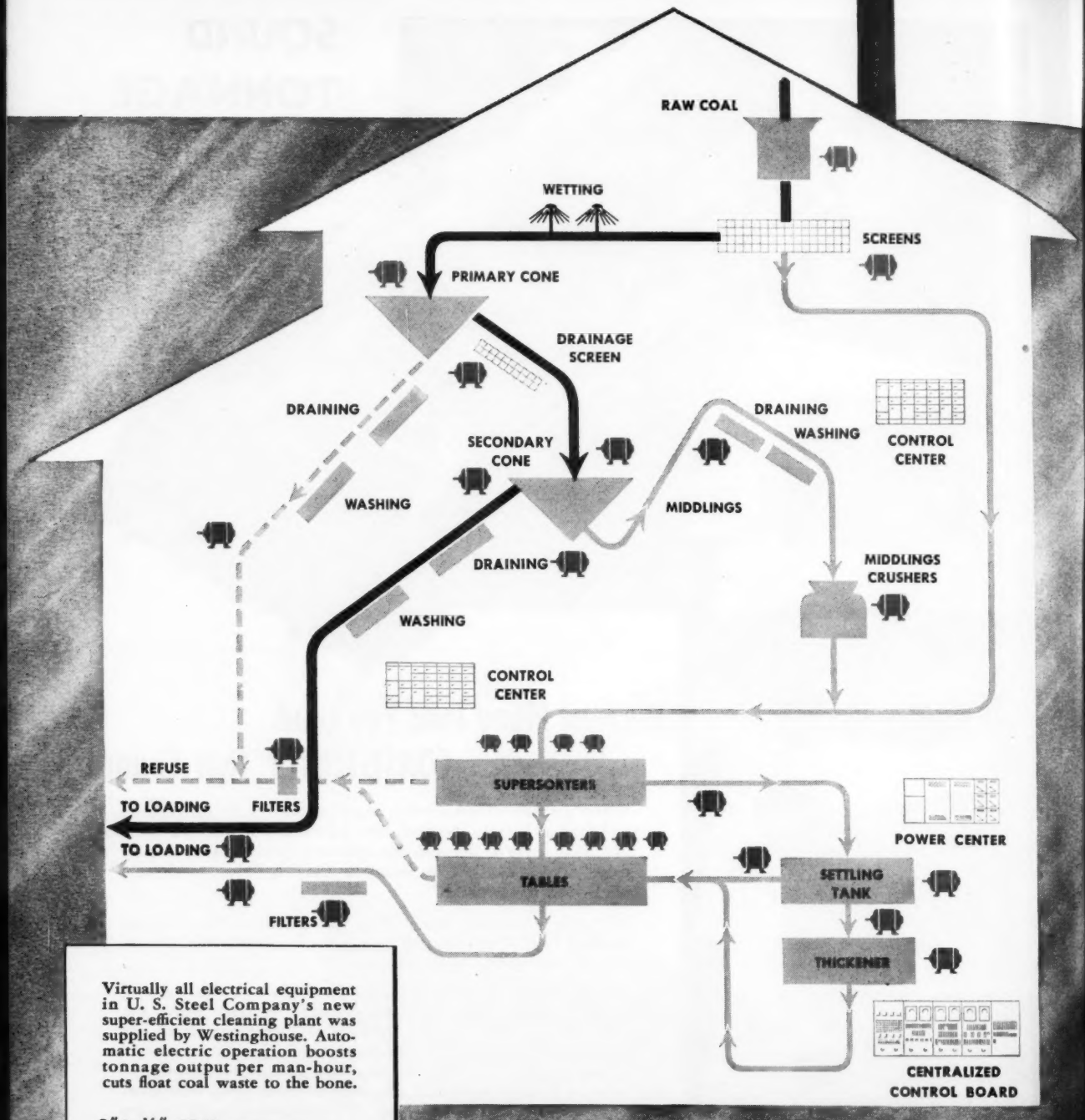
When we talk about loader capacity we try to be realistic and look at it from the coal mine operator's side of the desk. We don't believe the average operator gives a "toot" about rated capacities. All he wants to know is "How much coal will it load consistently?"

With the "Automat" three tons per minute is the average tonnage, but most important, it does it consistently, day-in, day-out with seldom a breakdown.

The "Automat" is the only loader available with that natural, smooth running, automatic shovel head. It goes under the coal, lifts and delivers it to conveyor at almost one stroke per second as illustrated. The loading head is the "business end" of any loader. All other loading functions of a machine, regardless of their individual efficiency, depend upon that loading head for their effectiveness. It's this loading head you are most interested in for production—don't overlook it. Since its inception—over 40 years ago as the first commercially successful mechanical loader—this shoveling principle of loading has been brought to its highest point of efficiency, the proved results of which have made the Whaley "Automat" so much in demand today for maximum production at the lowest cost per ton of material handled. Myers-Whaley Company, Knoxville, Tennessee.

MYERS—WHALEY

"Mechanical Loaders Exclusively For Over 41 Years"



Virtually all electrical equipment in U. S. Steel Company's new super-efficient cleaning plant was supplied by Westinghouse. Automatic electric operation boosts tonnage output per man-hour, cuts float coal waste to the bone.

3″ to ¼″ COAL

MIDDLINGS

REFUSE

YOU CAN BE SURE... IF IT'S Westinghouse

WESTINGHOUSE

EQUIPMENT FOR COAL MINING

How Automatic Operation Cleans 650 Tons of Raw Coal Per Hour

One of the world's largest, U. S. Steel Company's new cleaning plant at Robena, Pennsylvania turns out 650 tons of high-grade metallurgical coal per hour.

The last word in modern, efficient operation, the plant all but runs itself. The U. S. Steel Company and their cleaning plant designers, McNally Pittsburg Manufacturing Corporation, did a top-flight engineering job. And practically all the electrical equipment was supplied by Westinghouse, the electrical manufacturer with widest cleaning plant experience.

Plant Run by 18 Men. The basic secret of this outstanding operation is automatic, centralized control. A few buttons are pressed and the complex related equipment is started automatically, in just the right order. There's no time lost by men following check charts and running all over the plant. This reduces the chance of human error and, most important, it boosts output per man-hour. *Only 18 men on each shift run the entire operation.*

Smooth Operation, No Pile-ups. Once underway, plant operation is kept safe and smooth by additional electrical controls. If a piece of equipment becomes overloaded, a siren sounds to inform the operator. If the overload persists, coal feed to the unit is automatically stopped to prevent pile-ups. If the unit still remains overloaded it automatically shuts down to prevent damage.

Float Coal Losses Minimized. Another major advantage of automatic electrical control and first-rate equipment engineering is reducing the amount of coal sent to the refuse pile. It can't be eliminated entirely—but losses of float coal are kept to a minimum.

Call Your Westinghouse Office. When you're planning a new plant to turn out better coal and increase sales, make sure you get the best in electrical equipment. It makes a big difference. Call your Westinghouse office early in the planning stage. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-94848

Raw coal feeders are driven by Westinghouse motors and speed reducers. Motor speed is varied by remote control to adjust the rate of coal fed to the plant. All motors in the Robena cleaning plant are the totally-enclosed, fan-cooled type.

Incoming power enters these efficient, spacesaving Westinghouse power centers. Major elements are protective switchgear, ASL dry-type transformers (safest transformer ever built), feeder circuits to local control centers. (See next photo.)

How does he remember which motors to start first? He doesn't have to. Sequence-motor-starting automatically starts complex related equipment in the right order. Individual motor control is also provided for testing and special operations.

looking for a

tough mine power cable?

it's **ANACONDA BUTYL-INSULATED**

High Voltage Cable

No metal armor or lead sheath, yet . . .
There's even greater mechanical and electrical protection in the combination of *neoprene jacket* and *butyl insulation.*
Together they provide:
Unequalled protection from impact, crushing, twisting and abrasion.
Higher dielectric strength.
Greater resistance to moisture, acids, oils, ozone, heat and flame.
Less weight, more flexibility; easier to handle, install, splice and maintain. Lower first and final costs!

51349

ANACONDA *Butyl-Insulated High Voltage Cable is the modern cable for any mine—particularly mechanized mines. Anaconda also specializes in the manufacture of shuttle car cable and cable for the new continuous mining machines. Let our mine service specialists show you, or get in touch with your near-by Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.*

the right cable for the job

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Contents

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THE AMERICAN MINING CONGRESS
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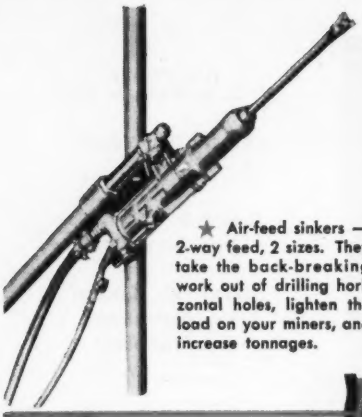
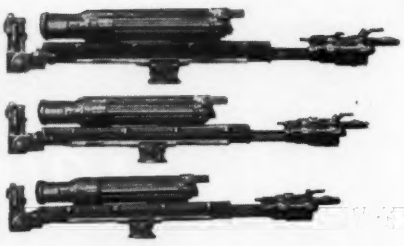
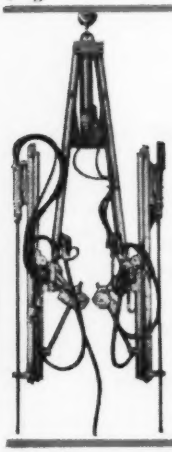


★ Air-feed sinkers — 2-way feed, 2 sizes. They take the back-breaking work out of drilling horizontal holes, lighten the load on your miners, and increase tonnages.



★ Power-feed and hand-cranked drifters. Dependable, powerful, and fast. Ideal for columns and jumbos alike.

★ A complete line of sinkers from 18 to 80 lbs. including the popular 45-lb. H10, and 55-lb. H111.



★ The SDR 34 shaft sinker for faster shaft sinking. Fully closed it's 5'6" between drill centers; open 19'3". All adjustments quickly made with air motor.

It's Le Roi-CLEVELAND

for

Rock Drills You Can Count On

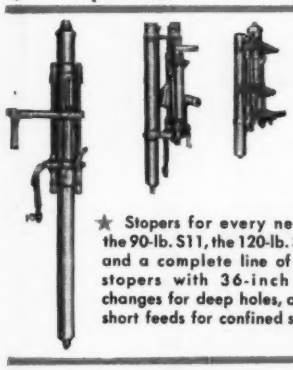
. . . . . fast-drilling, dependable favorites of mining men since 1906

Of course, you know that Le Roi-CLEVELAND builds the popular, easy-holding H10 and H111 sinkers... the fast-drilling PD24, 25, and 14 power feed drifters . . . the S11 and SS22 stopers with trip rotation for easier handling . . . and a mine jumbo that lets you drill out your rounds faster, with greater safety.

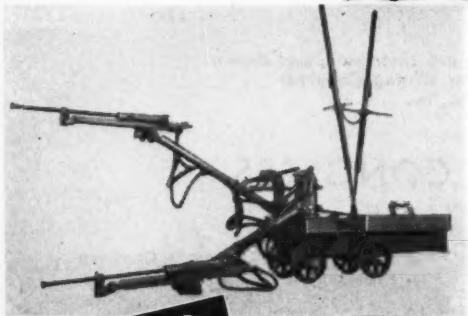
But did you know that Le Roi-CLEVELAND was responsible for some famous "firsts"? Here are a few of them—work-savers that help your miners increase their man-shift production: the air-feed sinker, the offset stoper, the shaft sinker, the stoper jumbo.

So if you have a job of drilling to do—do it with Le Roi-CLEVELAND machines. You can count on them. They're built for speed. And they're built to stay underground, too — where you can use this speed to do more work and cut your costs.

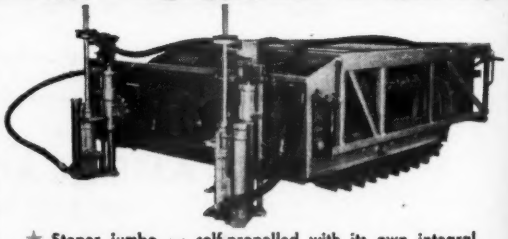
Detailed information about the complete Le Roi-CLEVELAND rock drill line is yours for the asking. Just write us.



★ Stopers for every need — the 90-lb. S11, the 120-lb. SS-22, and a complete line of offset stopers with 36-inch steel changes for deep holes, or with short feeds for confined spaces.



★ The famous MDR Jumbo with air-motor poweredbooms for quicker set-ups, greater safety, faster rounds.



★ Stoper jumbo — self-propelled with its own integral dust-collection system for positive dust control, the latest thing for roof bolting.

LE ROI

LE ROI COMPANY

RD-39

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road, Cleveland 11, Ohio

Plants: Milwaukee, Cleveland and Greenwich, Ohio

Heyl & Patterson Is Proud To Have Been a Part of The 1951 American Mining Congress COAL SHOW

This is the kind of an advertisement that an advertising person can write in only one place . . . in his hotel room in Cleveland . . . immediately after spending hours touring and thrilling to the marvelous exhibits.

Here was dramatic and potent tribute to American mechanical and productive genius.

When you left the Show you took with you a new feeling of confidence in the genuine might of America. You could forget for the moment the military bickerings about the Korean problem.

And somehow, down deep, you feel now that while enemy countries may threaten our country with disaster, American brawn and brain, as exemplified by the Coal Mining Industry and its unity of purpose, comprise a warning force that cannot be ignored by any potential invader.

Yes, Heyl & Patterson is proud to have been a participant in the Mining Congress Show, and proud, too, to be a contributor to the constructive plans of the Coal Mining industry.

Heavy Bulk Materials Handling Equipment
All the Way from Design to Erection

Ore Bridges
Railroad Car Dumpers
High Lift-Turnover-Rotary
Coal Preparation Plants
Coal & Coke Handling Equipment
Boat Loaders and Unloaders
Rotary Mine Car Dumpers
Coal Crushers
Coal Storage Bridges
Car Hauls & Boat Movers
Bradford Breakers
Refuse Disposal Cars
Thorsten Coal Samplers
Kinney Car Unloaders
Pig Iron Casting Machines
Cyclone Thickeners
Thermal Dryers

Heyl & Patterson, Inc.
"SINCE 1887"
55 WATER STREET · PITTSBURGH 22, PA.

AIRDOX or CARDOX

substitute the powerful yet gentle force of expanding air or carbon dioxide for the shattering blast of explosives. This opens the way to unique operating and distribution economies.

Savings start at the face where coal is rolled forward in a loose, easily handled pile, containing a higher percentage of premium sizes. Proportion of fine coal that may be lost in washing is reduced.

Savings increase all along the line. This coal keeps its size and firm structure through extensive mechanized handling, long distance shipment and rough treatment in the dealer's yard.

AIRDOX is a special application of compressed air; CARDOX utilizes expanding carbon dioxide. Methods of use at the face are similar. Both are widely accepted for their greater safety which permits on-shift use. Which of the two is best suited to your operations should be determined by a conference of our engineers and yours.

Ask for such a meeting. No cost or obligation, of course.

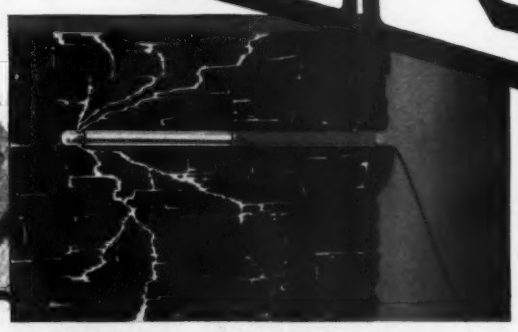
Write for descriptive bulletins of operating details and ASK FOR a free survey by a Cardox Corporation engineer.

CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS

AIRDOX

The "soft" heaving action of AIRDOX or CARDOX results in more premium size coal that resists degradation and commands top preference. No smoke, flame or fumes. Work can be resumed right after the fall.



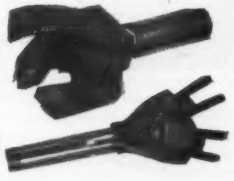
Gentle, piston-like action of AIRDOX or CARDOX produces more loose, economically handled coal. Freedom from shatter cracking protects roof and ribs of the mine.

CARDOX-HARDSOCG DRILLING EQUIPMENT

COAL RECOVERY DRILL

Salvages profitable tonnage where overburden removal has become too costly for further stripping. Cardox-Hardsocg Augers carry the coal in continuous flow from the seam. Hooked up with portable conveyor as shown, they provide automatic loading for cars or trucks. Available in diameters of 20" to 40".

CARDOX-HARDSOCG CUTTERHEADS



Proven for long life and top performance. Standard or Carbide-Tipped. Carbide-Tipped Cutterheads may be had with recessed core breaker as shown, or extended pilot and with spline, square or hexagon connections.

Other Standard Cardox-Hardsocg Drilling Equipment: Augers from 2" to 8" in diameter, bits, wedges, threadbars, sockets, boxing and boxing liners.

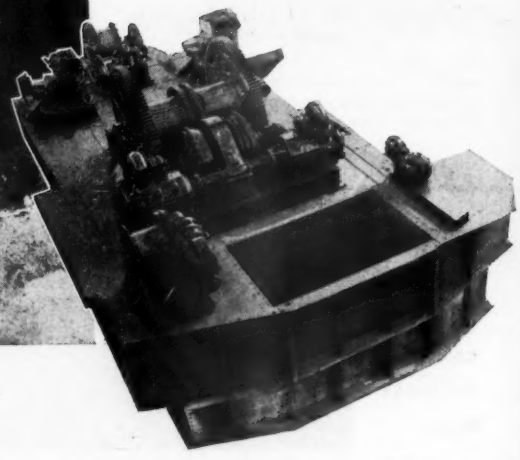
Loads 30 tons a minute —electrically!

1 With a 17-yard dipper and an 85-foot boom length, this new loader needs only five passes, averaging 35 seconds each, to load a standard 75-ton coal car! Thanks to G-E amplidyne control of hoist, swing, and crowd motions, the operator gets instant-acting response from the huge shovel, plus fast acceleration and deceleration that cuts cycle time to a minimum. With main drive completely G-E equipped, this world's largest coal loader contains motors totalling some 2000 horsepower.

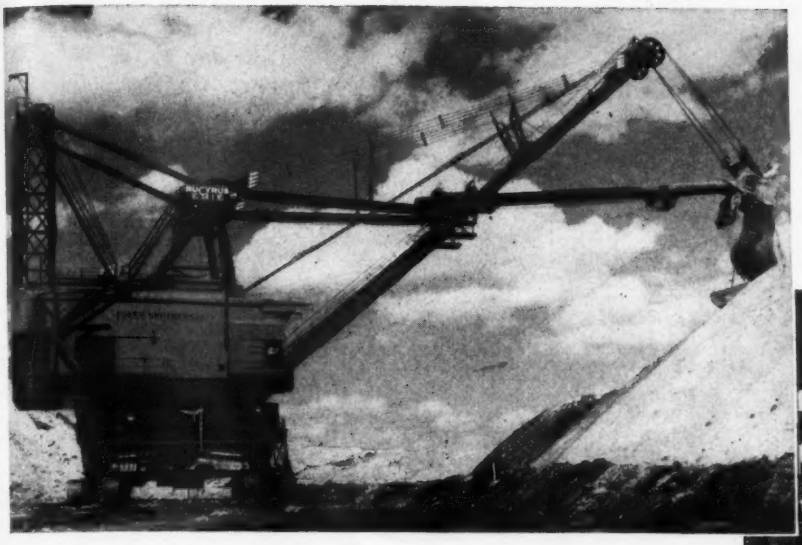
AMPLIDYNE-CONTROLLED

SHOVEL DRIVES

. . . to cut mining costs!



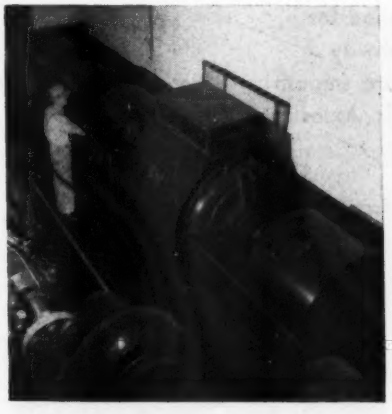
2 Muscle power for the loader—shown in this view of machinery deck during assembly—includes two 187½-hp hoist motors (foreground), two 75-hp vertical swing motors, and a 75-hp crowd motor (background). G-E MD series motors—the toughest G-E shovel motors ever built—permit handling heavier loads safely at higher maximum speeds, provide more hp per frame size, require less inspection and maintenance.



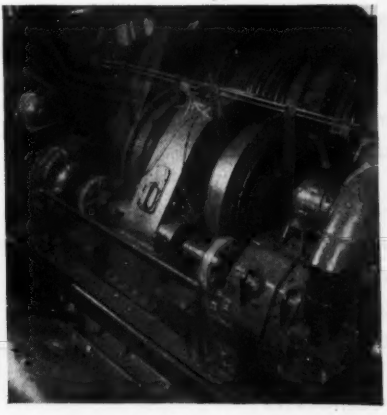
3 This mammoth strip shovel—the loader's teammate and also electrically equipped throughout by General Electric—can pick up a load of overburden with its 20-yard dipper and drop it 300 feet away! In addition to amplidyne control of all motions, it utilizes a G-E amplidyne power-factor regulator that substantially reduces voltage variation, permits more efficient operation of the equipment.

World's largest loading shovel—together with giant stripper—relies on G-E equipment to help maintain average output of 100 tons of coal per man per day at Foley Bros. Inc. operation near Colstrip, Montana!

4 Hoist, swing, and crowd motors in the stripper are precisely governed by its G-E amplidyne control, shown mounted atop G-E motor-control cabinet inside the shovel house, with G-E switchgear at left. Small and compact, it uses fewer control devices, takes up minimum space, protects equipment against excessive current and torque peaks.



5 Incoming a-c power, protected against outages by neutral grounding, is converted to d-c by this 7-unit motor-generator set. Neutral grounding assures maximum protection for operating personnel and minimum equipment shut-downs in case of any line-to-ground fault. On large shovels of this type, designed to pay off by continuity of operation and high output, this is an especially important factor.



6 These two G-E 250-hp hoist motors, as well as the stripper's other motors, are of extra-tough construction for extra-heavy duty. They feature removable top portion for easy inspection and maintenance—right on the shovel—without disturbing motor alignment. Removal of external connections and four bolts provides easy access to armature and brush holders.

7 Like the stripper's hoist and crowd motors this G-E 125-hp vertical swing motor, one of two, is built for extra-tough jobs. Literally thousands of shovels and draglines have been electrified by G. E. to boost output, cut costs. This experience is at your service when you call in a G-E mining specialist, or specify G-E shovel equipment. Send for Bulletin GEA-4843, "More Yards Per Day." *Apparatus Department, General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

663-11

SPRING MOUNTED REAR-DUMP EUCLIDS

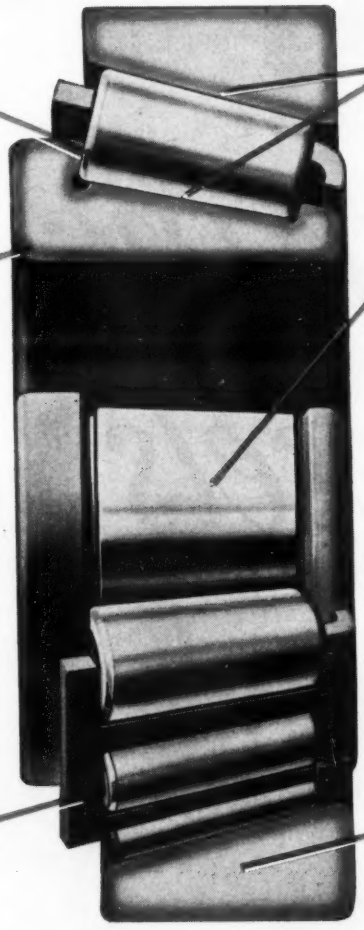
This new line of spring mounted Rear-Dump Euclids is designed for greater speed and stability on the haul road and long life in off-the-highway service. Heavy leaf springs are free floating in spring brackets to assure smooth riding and prevent breakage caused by twisting action on rough roads. Axles are positioned to the frame by longitudinal radius rods.

Rear-Dump Euclids with spring mounted drive axles range in capacity from 10 to 34 tons . . . diesel engines to 400 horsepower . . . and have travel speeds with full payload up to 35.7 m.p.h. Hydraulic booster steering assures positive control over all road conditions and reduces driver effort on sharp turns and rough hauls.

Built to the same high standards of construction and design that have made "Eucs" the favorite for tough hauling jobs, these improved models provide outstanding performance and lowest cost per ton or yard moved. Your Euclid distributor will be glad to show you how Euclid equipment can help cut your hauling costs and make more profit for you.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

10 reasons why your best bet in bearings is TIMKEN®



1 *Rib of cone maintains roller alignment, prevents skewing, assures maximum bearing capacity.*

2 *Generous radius permits greater shaft strength.*

3 *Available in 26 different types.*

4 *Precision manufactured. Available with runout tolerance of only seventy-five millionths of an inch (.000075").*

5 *Soft steel cage separates rollers, prevents scuffing.*

6 *Case-hardened surfaces resist wear.*

7 *Micro-inch surface finish makes friction negligible.*

8 *Available in 5850 sizes.*

9 *Made from Timken fine alloy steel for long bearing life.*

10 *Tough inner core resists shock.*

OTHER tapered roller bearings may *look* like Timken® bearings. But there is no other tapered roller bearing which gives you as many important advantages as you get with Timken.

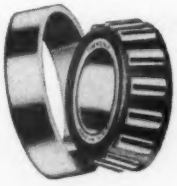
Ten of these advantages are listed above. They all stem from the fact that the Timken Company is the foremost producer of tapered roller bearings and leads in (1) advanced design, (2) precision manufacture, (3) rigid quality control, (4) special analysis steels.

Be sure that every tapered roller bearing *you* use carries the name "Timken", the trade-mark of The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

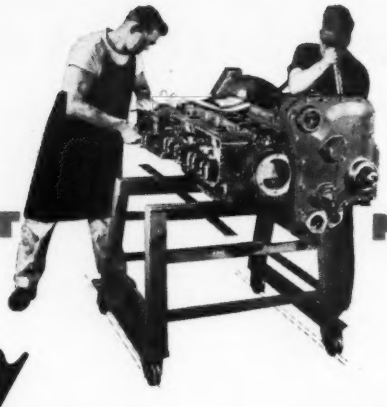
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳



BUILT NOT ONCE BUT TWICE

Cummins®

CUSTOM BUILT Diesels

Rugged, lightweight, high-speed Cummins Diesels perform better because they're custom-built to *fit each job.* And each engine is actually built twice. Assembled, run-in tested, disassembled, inspected . . . then reassembled and tested *again.* Precision building, Cummins exclusive fuel system . . . efficient service and parts organization, enable users to get peak performance, less "down-time" and *more* rugged, dependable power from Cummins Diesels. *See your Cummins dealer.*

Lightweight High-speed Diesel Engines (50-550 hp)
for: on-highway trucks
off-highway trucks • buses
tractors • earthmovers
shovels • cranes
industrial locomotives
air compressors
logging yarders and loaders
drilling rigs
centrifugal pumps
generator sets and power units
work boats and pleasure craft

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA
Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U.S.A. • Cable: CUMDIEX

Diesel power by CUMMINS

CUMMINS Dependable DIESEL

TRADEMARK REG. U. S. PAT. OFF.

MACK TRUCKS

Get Things Done!

● Extra effort—that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than on vital construction work and on the job of keeping raw materials flowing from the mines, the forests and the oil fields.

Here's work that's cut out for Mack trucks . . . jobs where big Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

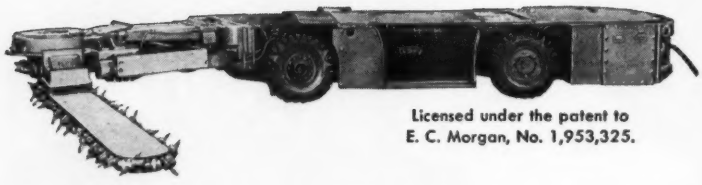
Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can boost output on your particular job . . . *get things done* faster and at lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

. . . outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

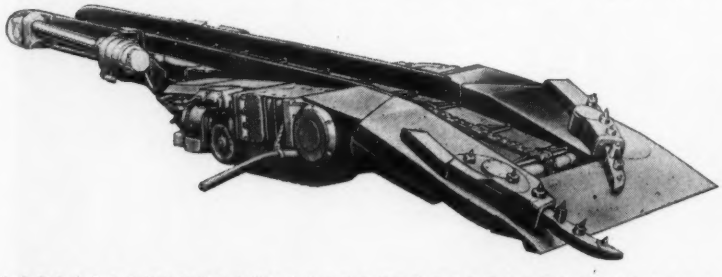
Model LRSW six-wheel SUPER MACK truck really "gets things done" in strip mining and excavating work—handles its 30-ton loads with round-the-clock dependability.



Licensed under the patent to
E. C. Morgan, No. 1,953,325.

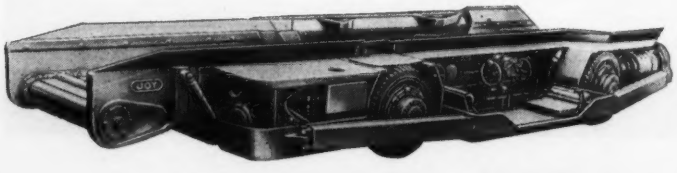
12-RB CUTTER

A rubber-tire mounted, mobile, fast-tramming cutting machine only 26″ high, supplied either as a bottom or top cutter. For slabbing, the cutter bar swings 90° to either side. Bar tilt, roll, and lift are fully hydraulically controlled. Hydraulic steering provides extra flexibility for easy maneuvering. 50 HP cutter motor provides ample capacity to keep ahead of the loader; separate motor drives the hydraulic pump.



20-BU-1 LOADER

Overall height is only 24″, yet this machine can load up to 8 tons per minute. Employs the exclusive JOY loading principle, also a new JOY development: the conveyor is driven independently of the gathering arm drive. This makes possible continued operation of the gathering head while a shuttle car is away, to provide a fully loaded conveyor for quick loading of the car when it returns. Also permits continued loading even when gathering arms are momentarily stalled with hard digging.



8-SC SHUTTLE CAR

Four-wheel positive drive, four-wheel hydraulic steering—with a new, wider, tapered-end design that permits minimum turning clearance. Only 26″ high, yet with level capacity of 2 tons. Centrally located operator's station gives equal visibility in either direction. Separate motors for traction, conveyor drive, and hydraulic pump drive. Exclusive JOY disc-type brakes on all four wheels—hydraulic cable reel and hydraulically-adjustable elevating discharge.

A HIGH CAPACITY Team for Very Low Vein Coal

We're proud to announce one of the greatest forward steps since the original JOY pioneering achievements in mechanical mining. *Now, for the first time*—with the advent of the JOY 12-RB Cutter, 20-BU-1 Loader and 8-SC Shuttle Car—high capacity production has become a reality for mines operating in very low coal. Here are some of the advantages. (1) The timing problems and labor of conveyor moves are eliminated in favor of the great flexibility and economy of shuttle-car mining. (2) The high mobility of JOY trackless equipment permits high-speed mining both on advance and retreat. (3) In case of a squeeze, only a few minutes are required to move all equipment from the section. ● *Call on us for any data you need.*

For thin or thick seams, whatever your operating conditions may be, JOY builds a complete, field-proved line of modern mining equipment to increase your tonnage and reduce your costs.

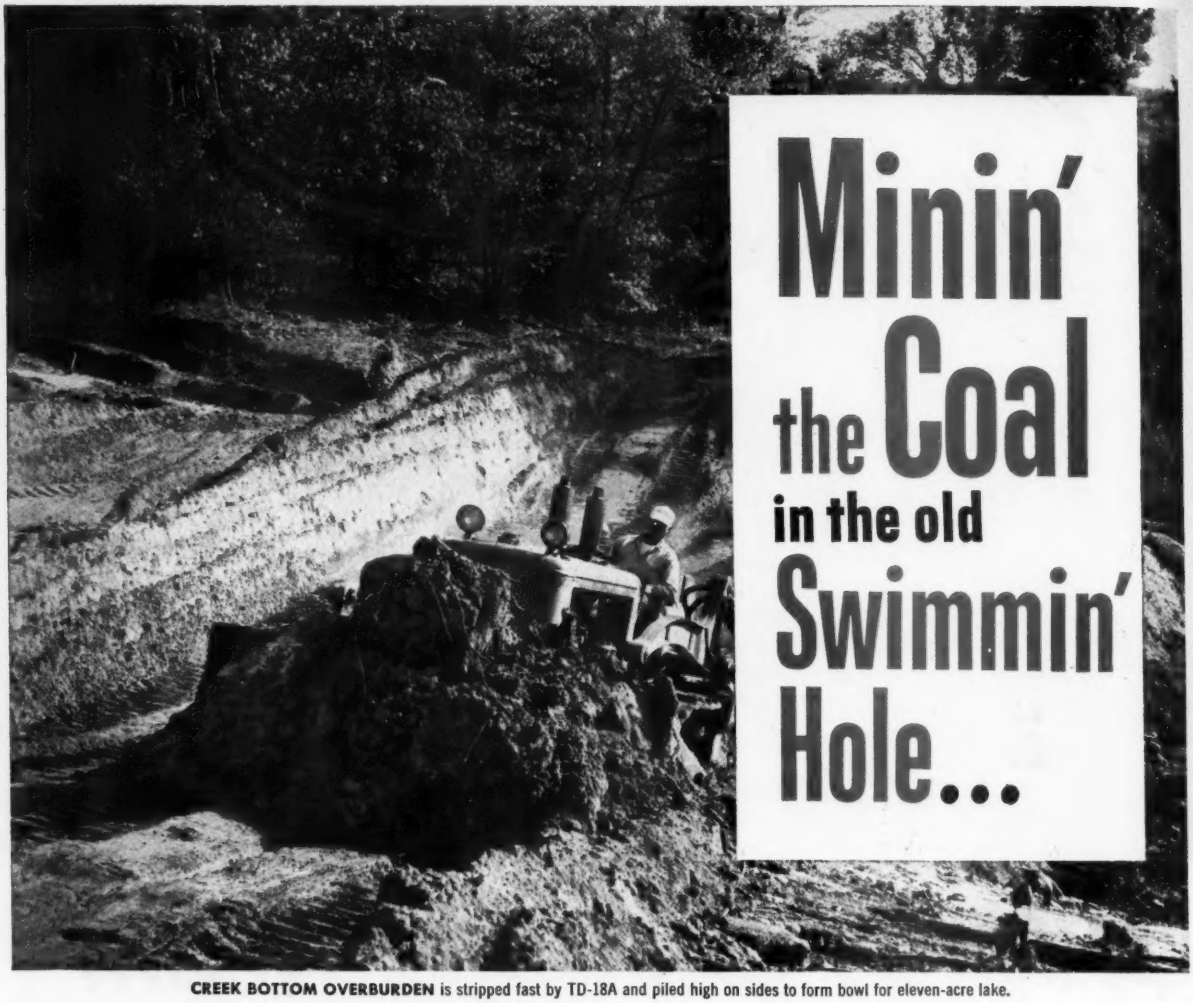
Consult a Joy Engineer

D CL 3410

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



Minin' the Coal in the old Swimmin' Hole...

CREEK BOTTOM OVERBURDEN is stripped fast by TD-18A and piled high on sides to form bowl for eleven-acre lake.

How an International TD-18A strips overburden in creek bottom coal mine, later to become a lake resort

They moved a creek to get the coal. And soon there'll be a new lake near Harrisburg, Missouri, compliments of Taylor Barnes, mine operator.

While creek flowage is pumped through a by-pass, a TD-18A strips overburden from coal and piles it high on the sides of the creek bed to form a bowl. When pit is abandoned, the creek will flood the bowl to form an eleven-acre lake.

Taylor Barnes sings the praises of the TD-18A: "We sure had our eyes opened by its performance, and the distributor service behind it."

Isn't it time you saw your International Industrial Distributor? His service department is fully stocked with International parts, and his factory-trained mechanics will keep your Internationals on the job and making money for years to come.

BOWL FOR SWIMMIN' HOLE takes shape as International crawler exposes coal underlying creek bed in profitable mining operation.

INTERNATIONAL

INTERNATIONAL HARVESTER

POWER THAT PAYS

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

Mine performance is the strongest evidence Goodman can offer of the ability of its tractor tread loaders to produce high tonnages. Here are some of the reasons why these loaders rate so highly:

...Swinging loading head — permits 17 foot clean-up width with only forward and backward movement of the machine. Posting can be close to the face.

...Swinging discharge end — can be swung 40° to either side and raised or lowered to shuttle car height.

...Loading efficiency — powerful digging ability in tight coal, excellent clean-up, fast action, rated capacity of 8 to 10 tons per minute in free loading coal.

...Safety for operator — unobstructed vision of all movements of both loading and discharge ends, all movements secured through conveniently grouped finger tip hydraulic controls.

...Sound design — construction is rugged throughout with convenient accessibility to working parts for inspection or repair.

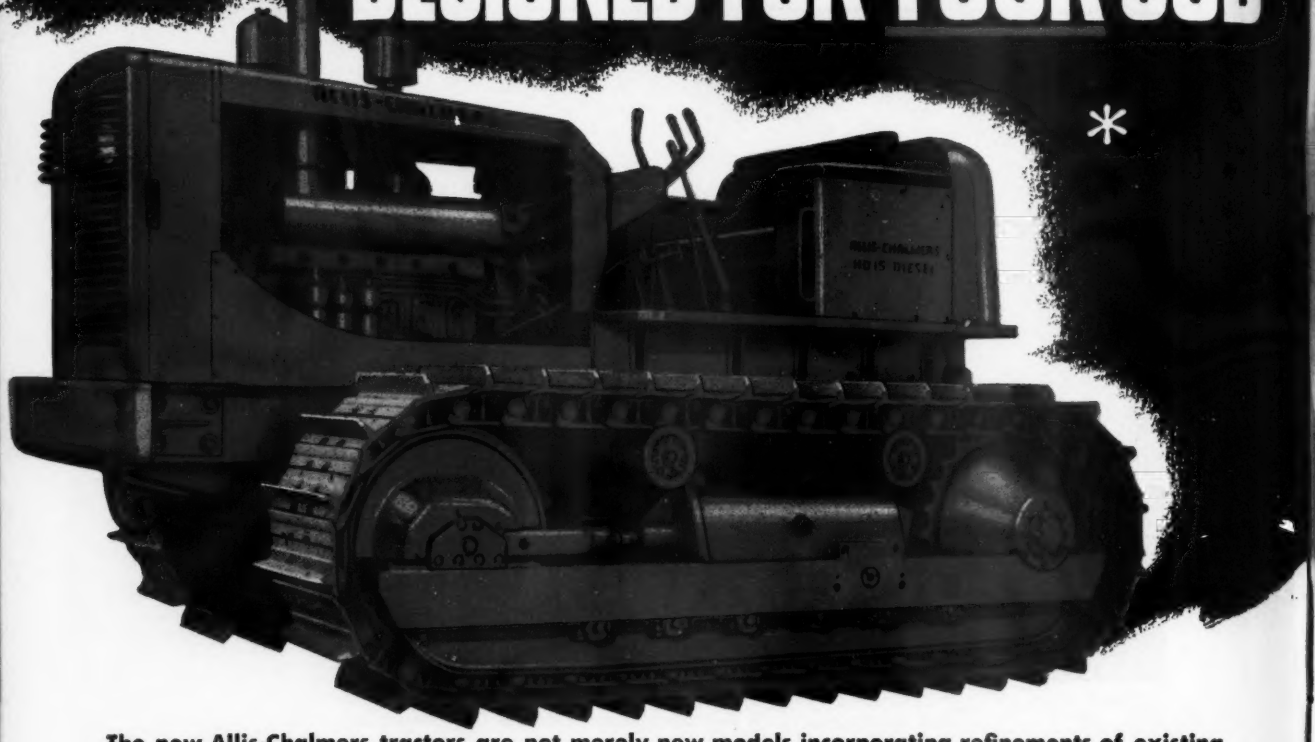
Before you decide on any . . . see Goodman loaders in action. A Goodman sales engineer will be glad to arrange a mine visit. See for yourself why they are "approved".

Goodman MANUFACTURING COMPANY
HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

CUTTING MACHINES • CONVEYORS • LOADERS • SHUTTLE CARS • LOCOMOTIVES

Here's what WE mean by

DESIGNED FOR YOUR JOB



The new Allis-Chalmers tractors are not merely new models incorporating refinements of existing ideas . . . they are new from the ground up . . . without compromise anywhere in design or material.

They are the answer to your demands for tractors that will give you outstanding performance on a variety of applications — whatever those jobs may be.

Behind the design are your own ideas . . . and those of your operators and mechanics . . . combined with the vast experience of Allis-Chalmers.

Check the following outstanding features . . . then get the full story from your Allis-Chalmers dealer on this — "THE FINEST TRACTOR LINE ON EARTH."

POWER TO SPARE — A large untapped reserve (up to 1/3 of peak available hp.) assures easier going on toughest work — longer engine life, less servicing. Moreover, it has been proved that General Motors 2-Cycle Diesels are unmatched in lugging ability; they build up torque faster and higher . . . hold it longer.

MATCHED POWER TRAIN ASSEMBLIES — Each and every part of the power train — from master clutch to final drive — has more than enough capacity and strength to handle any load it was ever meant to carry. Bigger clutches, booster steering, double-reduction final drives, all add life—get more work done.

REVOLUTIONARY SHIFT PATTERN — A quick, one-lever shift from any forward speed to any reverse position saves shifting motion and time — smoother and easier, too.

POSITIVE BALANCE — Tractors work equally well with any equipment — drawn or mounted. There's *greater stability* and *traction* with more track on the ground and lower structural weight. Main and truck frames are heavier, truck frames longer . . . idlers are bigger, and both idlers and sprockets lowered . . . all steel construction throughout. Up to 50 percent more ground clearance!

ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

The Newest, Finest Tractor Line on Earth!

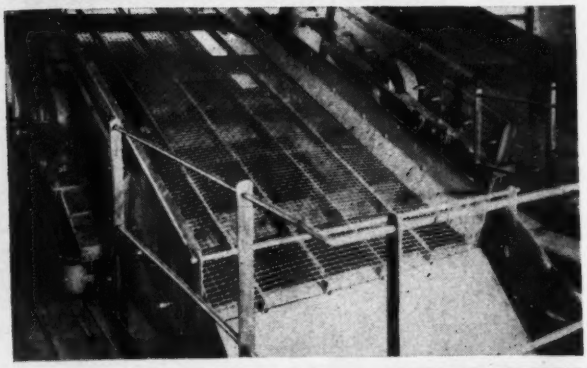
40.26 drawbar hp.
11,250 lb.

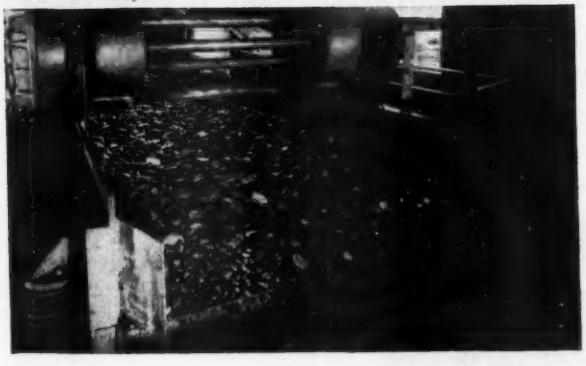
73 drawbar hp.
18,800 lb.

102 drawbar hp.
27,850 lb.

Hydraulic Torque Converter Drive
175 net engine hp.
41,000 lb.

- DESIGNED FOR YOUR JOB
- BUILT TO "TAKE IT"
- EASY TO OPERATE
- EASY TO SERVICE





SCREEN IT ACCURATELY

SCREEN IT ECONOMICALLY

—on Hewitt-Robins Vibrating Screens

You need closest possible control of sizes. You need lowest possible cost per ton. You can get both by putting the right vibrating screen on the job.

Here's where Hewitt-Robins can help. We introduced the circle-throw principle. We originated the elliptical throw. Today, we make vibrating screens in a wide range of types and kinds . . . handling everything from 9,000 lb. rocks to tiny specks . . . to perform every operation from scalping through sizing to dewatering.

The line of Hewitt-Robins Vibrating Screens is complete . . . ranging from 16" x 30" to 72" x 192" . . . floor mounted or suspended . . . with one, two or three decks.

Proper sizing is no problem . . . when you put it up to Hewitt-Robins. Your cost per ton will be low. Your maintenance expense will be minor; many Hewitt-Robins Vibrating Screens are still going strong after more than 12 to 20 years of continuous service.

Screen your product accurately. Screen it economically . . . on Hewitt-Robins Vibrating Screens. Tell us your need. We'll give you the *one best* answer. Write to Robins Conveyors Division, Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Hewitt-Robins is participating in the management and financing of Kentucky Synthetic Rubber Corporation.

HEWITT-ROBINS
VIBRATING SCREENS

HEWITT-ROBINS HR **INCORPORATED**

BELT CONVEYORS *(belting and machinery)* • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

how to win at "TWO-FINGERED" tug-of-war!

With just two fingers, your operator easily controls the single throttle lever on the Gardner-Denver Airslusher. Yet this load-lugging double-drum slusher hoist hauls a full pay load every trip — hurries the scraper back to the muck pile — pronto!

It's powered by the famous Gardner-Denver 5-Cylinder Radial Air Motor that tugs stubbornly at any speed — develops top speed and power in either direction.

Gardner-Denver Airslushers don't waste air idling between trips. Three sizes, for 1100, 2000 or 2500 pounds rope pull.

SINCE 1859

GARDNER-DENVER

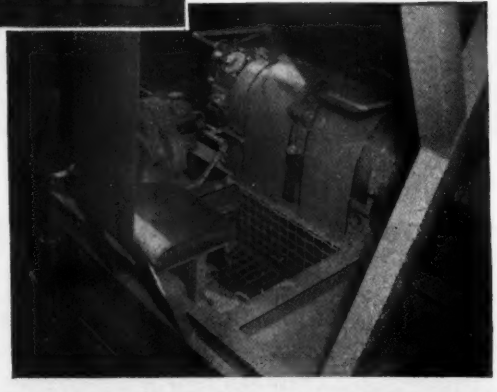
Write for bulletins giving complete information.

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Completely protected against dirt and water, handy Gardner-Denver Air Hoists are made in several sizes, and for various rope capacities.



Designed for *safe* one-man operation, the Gardner-Denver HMS Shaft Mucker is widely used on shaft mucking rigs. Positive safety lock.

What's YOUR problem?

Fred A. Barnes is the lubrication specialist who advised this midwest mine to use STANOIL in its speed reducers to safeguard gear teeth. With headquarters in Standard Oil's Decatur office, he was able to give prompt attention to the problem posed by the mine operators.

There's a Standard Oil lubrication specialist located near your mine. He's one of a corps of highly trained, experienced men throughout the midwest, and he's ready to help you make significant savings.

Arrange now for the visit of the lubrication specialist serving your area. Just phone or address a card to the nearest Standard Oil Company (Indiana) office. Ask him to explain the advantages of these other Standard petroleum products:

SUPERLA Mine Lubricants—These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

SUPERLA Greases—Available in lime soap and soda types, SUPERLA Greases cover a wide range of applications. These products are comparable in quality to the highest type of special greases but are as readily available and economical as ordinary cup greases.

Keeps speed reducers geared to greater tonnage . . .

A MIDWEST SURFACE MINE has processed an average of some 4,000 tons of coal per day in its large preparation plant. The continuous high output of this plant has been largely a result of decisions made two years ago by officials of this mine.

At that time, the preparation plant was put into operation. One of the decisions made by the mine operators was based on the recommendation of a Standard Oil lubrication specialist. The operators gave STANOIL Industrial Oil the important job of lubricating gear reduction units used in driving the processing equipment.

In the two years of operation, no cleaning of the reduction units has been necessary. Although changed each year as a matter of routine, STANOIL has shown no deterioration in service. Gear teeth have remained in excellent condition. Moreover, plant operators report that with the use of STANOIL there have been no heavy starting loads due to the oil's thickening at low temperatures.

STANOIL
TRADE MARK
Industrial Oil

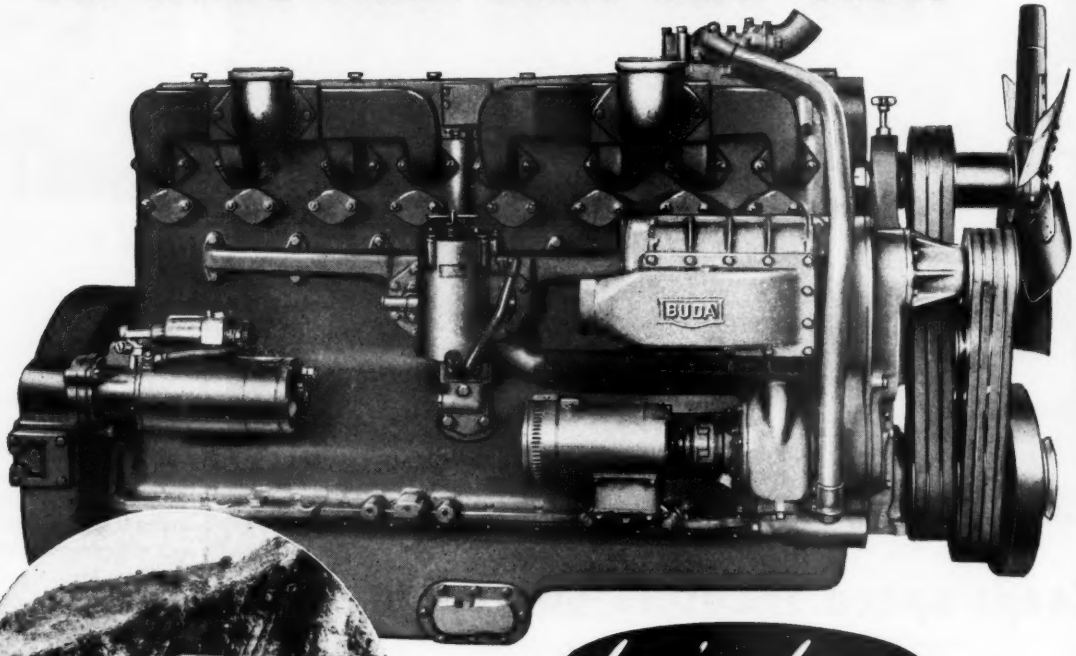
You can simplify your mine lubrication jobs by using STANOIL Industrial Oil. It provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems.

To assure you of maximum benefits from STANOIL and other high-quality petroleum products, the Standard Oil Company has a well-trained and experienced lubrication specialist near your plant. To obtain his prompt and expert services phone your local Standard Oil Company (Indiana) office, or write to: Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

Big 350 h.p. BUDA Super Diesels

Cut Mine Haul Time and Costs



Buda 1125 Dyna-Swirl Diesel powers this Model 140 Dart Truck at Bagdad Copper Corp.

Model 140 DART powered by Buda 1125 Super Diesel hauls 22 ton payloads up 12% to 18% grades with 5 switchback turns at 4 MPH in 4th gear.

here's why....

BUDA Dyna-Swirl DIESELS give:

- ★ 10 to 17% higher usable torque (lugging ability).
- ★ 12 to 18% more horsepower at normal operating speeds.
- ★ 6,000 or more operating hours between major overhauls.
- ★ Less operator fatigue—smoother operating—less noise—less smoke—less vibration.
- ★ Controlled governor action and progressive starting definitely easier on clutches, transmissions, final drives and tires.

Give old Units new life—repower with BUDA. There are no finer precision-made Diesel engines than BUDAS! Ask your Buda Distributor for the facts today on the BIG new "DA" Diesels. Write for free colorful bulletin and specifications. ***The Buda Company, Harvey, Ill.***

BUDA

a Power-Full and Dependable Name in Engines

BUDA COAST TO COAST FACTORY EXPERIENCED SERVICE AND PARTS

BC-11

Material on Mining Bits

Proper instructions, vitally important to the correct use of carbide tools are available on mining machine bits, coal auger bits, strip bits, and rock bits. They are thorough, time-tested, and reliable. Write Kennametal Inc., Latrobe, Pa., pioneers and world's largest manufacturers of cemented carbide mining tools.

A complete tool catalog is also available that gives specifications, prices, and performance data on Kennametal Mining Tools. Specify M-6. Any of the above material will be sent to you on request.

•

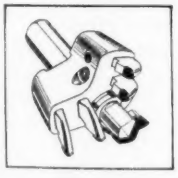
New Bit Rotary Drills Bolt Holes in Laminated Sandstone

Drills hundreds of feet in hard roof

To give the greatest wear resistance in drilling hard roof, the Kennametal HFD Bit is tipped with a thick insert of Kennametal cemented carbide. The bit fits into regular Kennametal Roof Bolting Rods. It is powered by ordinary electric drills. Material drilled with the bit is slate, shale, and laminated sandstone. The four main features of the bit are: (1) Smoother hole without rifling, (2) Longer gage life in hard roof, (3) Easy bit sharpening, (4) Lower bit cost than obtainable with any other bit used for drilling medium hard mine roof. Sizes are 1¼-inch to 2¼-inch, prices range between $4.85 and $14.80, depending upon size and quantity.

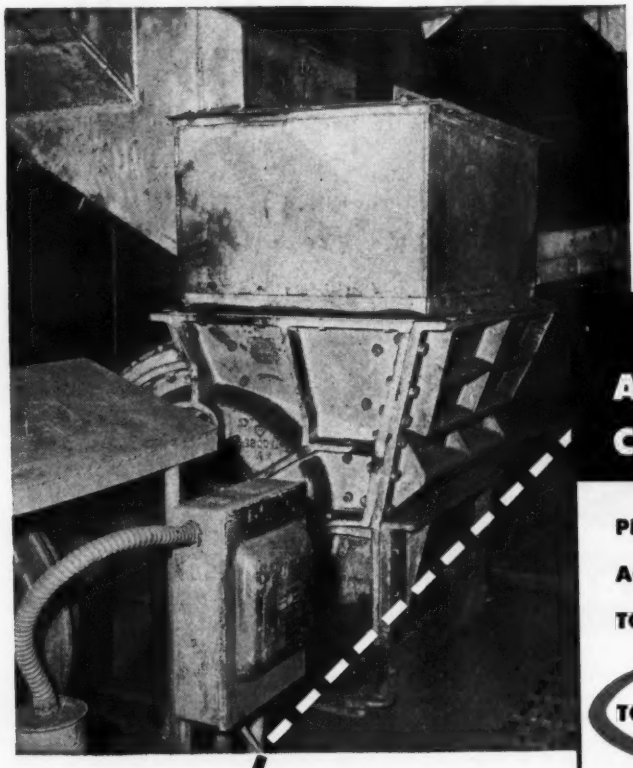
•

Machine Bits Bore Rock



Six regular mining machine bits act as cutting teeth in this rigidly constructed bit used for rock boring. The "teeth" are set in a heavy cast steel head. They are secured by set screws which allow them to be removed for sharpening when dulled. Drilling speeds are 3′ to 3½′ per minute in average drilling. Feature: Ability to drill hard rock formations. Style is UD 6½". The price, including bits, is $45.10 to $59.40 depending upon quantity.

These "CRUSHING" FACTS



Another
American Crusher CASE HISTORY

PLACE: Illinois Coal Mine

AGE OF CRUSHER: 14 years

TOTAL TONNAGE CRUSHED: 1,472,805

TOTAL COST PER TON: one half of 1¢*

...again prove AMERICAN CRUSHER performance

* The total cost figure for the 14-year coal crushing operations of the Illinois coal mine, whose American Crusher record is shown above, includes: original cost of crusher (completely depreciated); plus cost of replacement parts; plus maintenance costs; plus interest on original investment (at 3% for 14 years).

But here is the really signficant fact: an independent survey of users of American equipment has shown that this performance record is a typical one for Americans—a consistent pattern of high tonnage reduction at remarkably low parts-replacement cost.

Only such features as the exclusive Crushing Ring Design—originated and perfected by American—could reduce coal in power plants and coal mines across the country year after year, ton after ton, for *less than 1c per ton.*

Find out how you may reduce the cost of your own crushing problems.
Write for detailed information and illustrated literature.

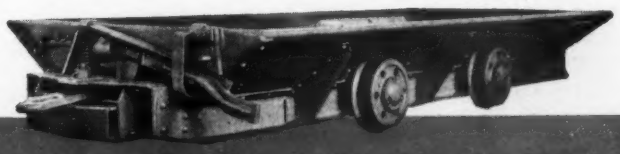
American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1019 Macklind Ave.
St. Louis 10, Mo.

A thousand-and-one new kinds of military equipment to be produced...a thousand-and-one new needs for coal! The rearmament plans to take about 530 million tons this year alone. And you know your mine will be working under pressure, as the program really gets under way!

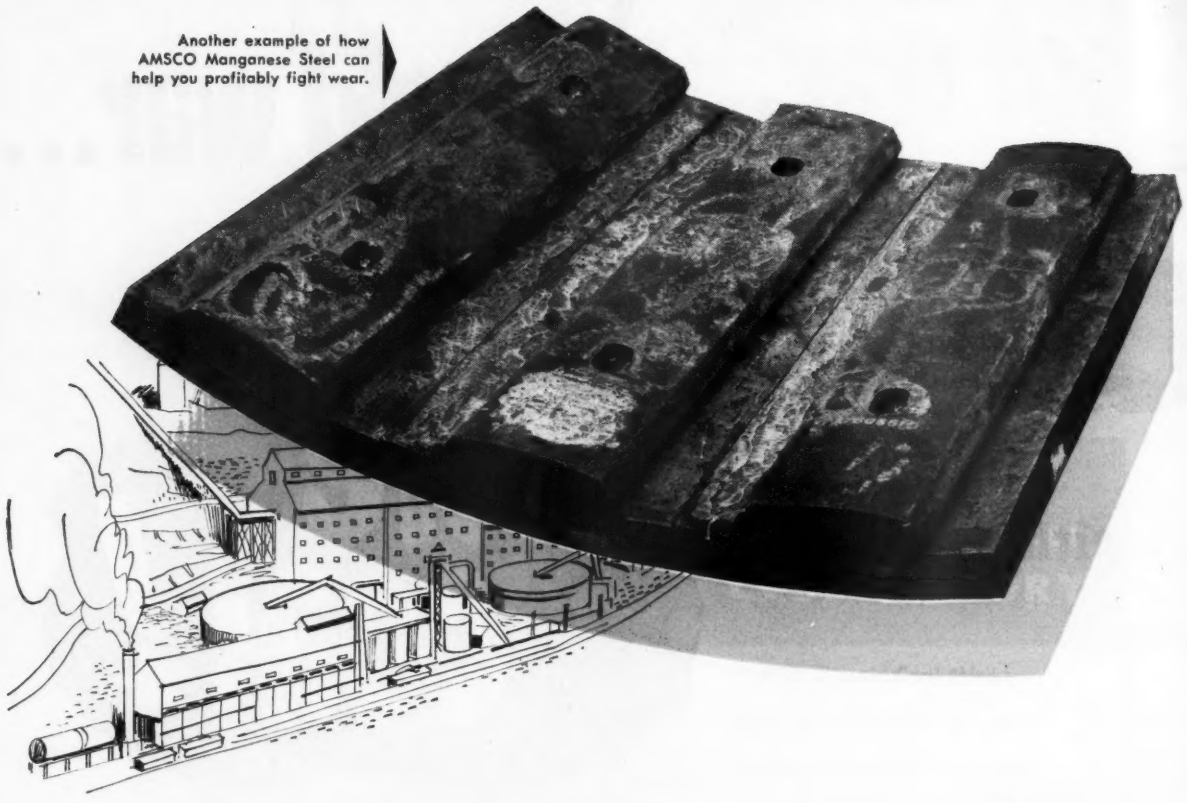
That's why you should consider constant haulage mine cars *now*. Remember—a troublesome car doesn't stop your coal from moving. Shunt it off onto a siding... all the rest of your cars keep hauling coal. Mine car breakdowns won't shut down your mine at the time your coal is needed most!



a.C.f. MINE CARS

for Constant Haulage

If you are planning a new or streamlined haulage system, get the complete facts on the advantages of a complete mine car system. Your A.C.F. Representative will gladly get them for you. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland Philadelphia • Huntington, W. Va. • San Francisco Washington • Berwick Pa.



These LINERS lasted 6 times longer

How AMSCO Manganese Steel increased production . . . lowered costs per ton

A large Western mine had a problem that's all too common . . . Rod Mill Liners that lasted approximately 100,000 tons before an expensive replacement job was necessary.

In July of 1949 something new was tried. This mine installed AMSCO Liners equipped with a specially designed renewable lifter. Result? The AMSCO Liners milled 640,208 tons . . . over 6 times the tonnage of the liners formerly used. There were two important reasons for this tremendous increase in service life:

1. The liners were made of AMSCO Manganese Steel, the toughest steel known for high resistance to abrasion and impact.

2. The overlapping type AMSCO Renewable Lifters took the brunt of the load—reduced the need for replacing the more expensive liners. The lifters alone milled 340,322 tons . . . over 3 times more than the old installation!

WHEREVER YOU MEET A PROBLEM OF WEAR CAUSED BY IMPACT AND/OR ABRASION . . .

. . . find out about longer-lasting, dollar saving Manganese Steel made by AMSCO . . . world's largest producer of Manganese Steel Castings for all industry.

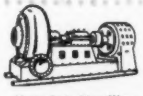
AMSCO controls impact and abrasive wear in 5 basic industrial operations:


Power Transmission


Mining and Excavating


Transportation


Crushing and Pulverizing


Materials Handling

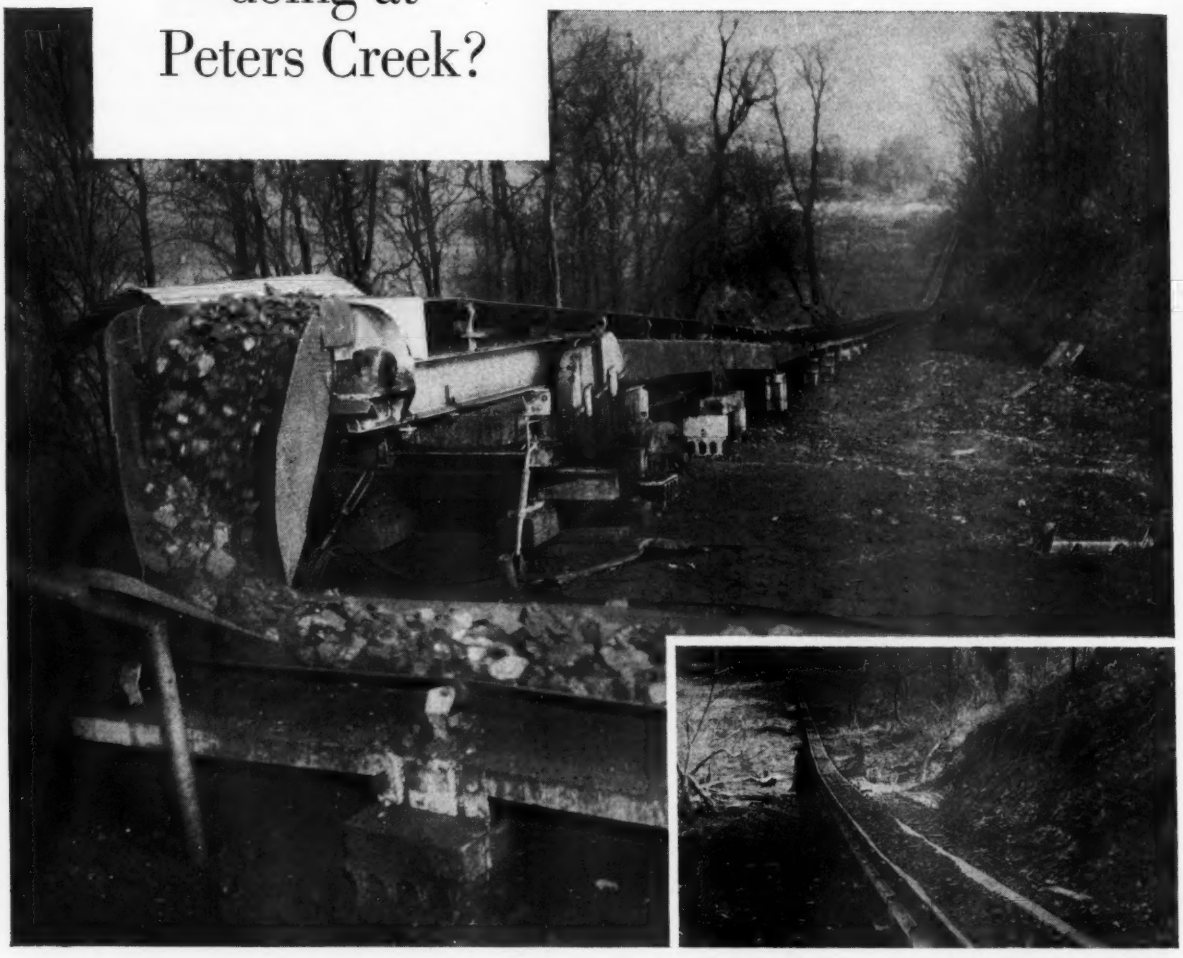
AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

422 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

What's U.S. Rubber doing at Peters Creek?



Large photo shows coal being transferred from one belt of 3100′ centers to belt of 1700′ centers. Small photo shows section of the 3100′-center belt. Note the troughability and excellent training.

ITS BELTS are carrying 300 tons of crushed coal per hour. These belts, three in number, are known as U.S. Giant 4-ply Style XN Conveyor belts, of patented nylon construction. They connect the crusher to the tipple of Peters Creek coal mine. The belts replaced 10-ton trucks which always became mired in winter mud. This unusual conveyor installation provides a steady, dependable flow of coal over hills and through valleys, saving trucking and handling.

When you have a coal haulage problem, call in a U.S. Rubber engineer. He is a specialist in overcoming obstacles, lowering haulage costs.

Here the 1700′ center belt carries the coal along to the tipple. Note how it "contours" or hugs the terrain, taking the straightest possible course to its destination.

PRODUCT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Going Great Guns—

TO MAKE AMERICA STRONG!

It looks like a new secret weapon—and it's every bit as vital to American defense! Actually, it's a high-speed coal drill—just one of many hard-hitting, modern machines that make it possible for the American coal miner to outproduce any other miner in the world—3 to 1!

This year—in addition to peacetime demands—millions of tons of coal are urgently needed to power the making of ships and tanks and planes. Will there be enough coal for every need? Here's why America's privately managed coal companies can—and do—say *YES!*

Today, 97% of all coal is mechanically cut and 70% is mechanically loaded. The modern American miner is a skilled machine operator whose output has risen more than 20% since 1939. *This efficiency gain is one of the largest made by any American industry.*

At the modern mine, great preparation plants turn out far better coal. When this better coal is used under the more efficient present-day boilers, it generates *three times* as much energy per ton. *Today, the coal sent to the nation's defense plants works harder for defense!*

New mines—1,000 of them in the last five years—are replacing "mined out" or unproductive properties. *These new mines alone can produce more coal than all the coal mines of Communist Russia!*

Progressive private management, spurred by the powerful stimulus of free competition, has brought America's coal industry to a higher per-man output than ever before. America will have all the coal it needs to become strong—and stay strong!

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association

WASHINGTON, D. C.

FOR NATIONAL DEFENSE FOR PEACETIME PROGRESS

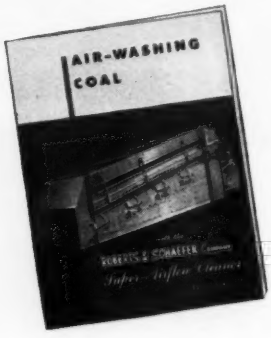
YOU CAN COUNT ON COAL!

FREE TO COAL EXECUTIVES

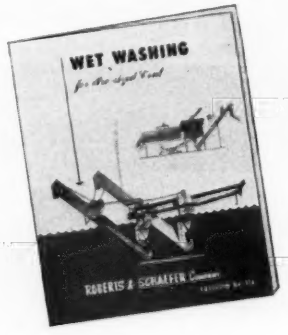
THESE FOUR *NEW* INFORMATIVE BULLETINS

BULLETIN No. 174
Title, "Preparation Parade." Twelve pages in color; gives complete operating data on five well engineered, well run coal preparation plants. A section in the back of the bulletin summarizes latest preparation equipment. Truly a *parade* of modern coal preparation plants and equipment

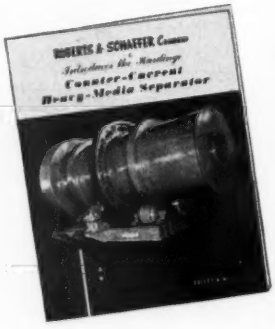
You will find page after page of valuable coal preparation news and data in these four new bulletins. One of the bulletins, "Preparation Parade," tells the step-by-step inside stories of five outstanding new preparation plants. Another tells about the Hardinge Counter-Current Heavy-Media Separator, a unit that was proved successful in the iron ore range and was recently adapted for coal preparation. Each bulletin is completely new . . . and definitely worth having. You can get your free copies without obligation by using the coupon at the bottom of this page.



BULLETIN No. 175
Subject: Air Washing Coal. Eight pages in color; gives complete information on the Roberts and Schaefer Company Super-Airflow coal cleaning units. Drawings and specifications of various size units, typical flow sheet and other useful information also included.



BULLETIN No. 176
Subject: Wet Washing Coal. Eight pages in color; shows complete line of Roberts and Schaefer Company wet washing equipment. This is the first time that all R&S wet washing equipment has been described in detail in a single bulletin.



BULLETIN No. 177
Subject: Counter-Current Heavy-Media Separation. Four pages in color; explains principles and operation of the Hardinge Counter-Current Heavy-Media Separator, a separatory vessel that Roberts and Schaefer is introducing to the bituminous coal industry after its success in the iron ore range.

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Editorials

Volume 37 JOHN C. FOX, Editor June, 1951

Let the Lamp Shine

"PEOPLE do not light a lamp and hide it under a peck-measure, they put it on its stand and it gives light to everyone in the house. Your light must burn in that way among men, so that they will see the good you do, and praise your Father in heaven."

This quotation from the Sermon on the Mount, as translated by E. J. Goodspeed in "The New Testament" an "American Translation" is particularly applicable to the mining industry. One of our most basic industries and the backbone of our civilization, mining has too long been treated as something to be locked in the attic when visitors come to call.

Everyone knows there are about 621,400 miners in the country. News of strikes has impressed that on the public mind. How many know that for every three men engaged directly in mining seven jobs are created in service industries and 36 people are thereby supported? It is up to mining to get through to everyone: rich man, poor man, beggar man, thief, doctor, lawyer, merchant chief. They all must be told, and understand, how much mining means to each one individually. The farmer must be reminded that the tools he uses are made of metal; the fertilizers he uses to increase his crops and to restore the plant nutrients to his soil are products of the mineral industries. The auto worker in Detroit depends on mining for his livelihood and the butcher in New York needs his knives. The housewife everywhere would have no kitchen utensils, or dishes, or even a house if the miners were not on the job. We must bring home to each one how dependent he is on coal mining for warmth of home, power for industry, light to see and for basic chemicals that enter into a myriad of products of daily use.

The popular press features mine catastrophes and strikes on the front page but good news about the industry is relegated to the inside pages and often reaches them in garbled form—not through design but through misunderstanding.

A start has been made by the coal industry to bring to the public's attention the good things about mining through carefully prepared news releases, radio broadcasts and TV shows. One of the finest things done in this program was to invite representatives of wire services, radio stations and magazines to a press conference. Those who attended were taken on a tour of the mines, preparation plants and laboratories. They were briefed on health and safety precautions taken for the benefit of the miners. Improvements in ventilation, mining methods and labor relations were discussed. Union representatives addressed the meeting and pledged cooperation with management. In short, some of the cloud of ignorance was dispelled.

Employe magazines let those engaged in the industry know what plans are afoot, and what the companies' policies are. Designed primarily for employe reading, such publications have far-reaching effects. The best way to disseminate information is still by word of mouth. A miner, well informed and enthusiastic about his job and company, will talk to his non-mining friends telling them of the good things in his daily work, why he is proud to be a miner, and why he would not change jobs with any man.

The start made by the coal mining industry must be taken up by all branches of mining. It is not enough to send out press releases and hope that they will be printed. Mining must be dramatized. It pays off. How many are there among the leading mining men today who were influenced in choosing their profession by the books of Richard Harding Davis? If he hadn't dramatized the mining engineer many of the leaders of our industry would be following other professions right now.

Let's light that lamp, set it up high and let it shine for the whole world to see.

The Coal Industry In the Modern Crisis

Hon. JOSEPH C. O'MAHONEY
U. S. Senator from Wyoming

Senator O'Mahoney is a most ardent supporter of research and development for the manufacture of synthetic liquid fuels from coal. In this address before the opening session of the American Mining Congress Coal Convention in Cleveland on May 14, he strongly urges that private capital undertake the investment necessary to establish an industry which research has indicated is economically feasible. Such a project, he says, would be in the tradition of the free enterprise which has made the United States the leader of the free world, and would allay fears that we have imperialistic designs on other countries potentially rich in petroleum.

To quote the Senator: "It is patience, tolerance, intelligence, charity and, above all, faith in our own ability to use the resources with which nature has endowed us that will show the whole world how the builders can in fact abolish the destruction of war."

FOR the third time in the 20th century the whole world hovers on the brink of a global war, although the second half of this century is less than six months old. We who have lived in any part of this century need no one to tell us the terrible cost of war in human life and suffering. Now we seem to be drifting helplessly toward a third global conflict in which, if it occurs, we know that the great discoveries and inventions of science and technology will be used to destroy millions of lives and to lay waste the habitations of men on every continent.

Is it the destiny of the people of America to participate in such a struggle or have we the intelligence and the will to demonstrate to all the peoples of the world that peace can be achieved?

Are we to be builders or destroyers? If the peoples and the leaders of other nations are unable to point the way to peace, must we also be condemned to confess that we are unable to show the world how men can build a permanent peace?

I know of no better forum in which to raise these questions than at this session of the American Mining Congress. I say that because those of you who are assembled here know from personal experience what has been done in the United States to raise the standard of living and security for the people of this country by the intelligent use of natural resources. But you know also what a terrible toll war takes, not only upon the human resources of a nation but upon its material resources. During this 20th century we have dug the minerals from our hills to scatter them broadcast throughout the world in war. The Mesabi range in Minnesota was the greatest deposit of iron ore in all the world. Discovered 100 years ago, it provided the raw material from which industry made the iron and steel through the use of which this country became the leading industrial nation of the world. Yet, during the six years of World War II, we took from those hills one-fifth of all the iron ore that had been extracted from them since iron was discovered there 100 years ago.

Again, in the Korean war we are paying not only with the lives of American soldiers but we are also paying with American minerals which could be used to build a greater future for this and for coming generations. Approximately 1,000,000 tons of steel, aluminum, copper, zinc and other minerals that have been fabricated here into bombs and shells and bullets are being showered upon that hapless peninsula.

No nation in history was better endowed with natural resources than this, and because this nation was founded by men who had faith in freedom, we have made it possible here for the intelligence of the individual to be applied constructively to the utilization of these resources.

It was because of my conviction that the future holds vast possibilities for the development of our natural resources in building constructively for peace that throughout my service in the Senate I have been urging better and more intensive utilization of them. It was this I had in mind when in 1943 I introduced the bill to authorize the United States Bureau of Mines to construct and operate demonstration plants to show how liquid fuel can be made from coal and oil shale. These experiments have already proved that the commercial production of liquid fuel is attainable from our huge deposits of both coal and shale that are known to exist in this country. Indeed, it is indicated that gasoline can now be made from coal at a cost competitive with natural petroleum, if we take into account the income to be derived from certain by-products. It is unnecessary to tell this audience what this means for the future of America and the future of the world.

By the intelligent utilization of our coal resources we can set an example to the peoples of other lands to do likewise. We can prove that there is

no ground for fearing that natural resources will be exhausted and the people rendered unable to support themselves. That fear has been entertained by peoples from the beginning of time.

Fortunately, no one can predict that our coal reserves will be exhausted, because it is known that coal is our largest available source of fuel, and that within the boundaries of continental United States lie practically one-half of all the known coal reserves of the world. We know that there are many productive ways of using coal besides burning it in its raw state under a boiler. We are consuming in excess of 100,000,000 tons more coal every year now than we were at the turn of the century and we are mining coal much more efficiently than we were at that time. The people of the United States are using more energy than at any previous time. Our population has doubled in the last 50 years, but the energy consumption has more than quadrupled.

In 1949 this coal, though it exceeded the production of 1905 by 100,000,000 tons, represented only 39.8 percent of the nation's energy consumption, as compared with 86.9 percent in 1905.

The Place of Synthetic Liquid Fuels

I had this in mind when in February, 1948, I introduced amendments to the then-pending tax bill to provide a 27½ percent depletion allowance and accelerated amortization to stimulate the investment of private capital in plants designed to make synthetic liquid fuel from coal. The amendment failed to pass in the 80th Congress. I know of no reason why coal used for such a purpose should not have as great a depletion allowance as that granted to any other mineral. Private capital must be induced to invest in the synthetic fuels industry; in my opinion, special consideration should be given to such private investment.

When I introduced the synthetic fuels bill authorizing the Bureau of Mines to construct and operate demonstration plants, it was not intended to be a first step toward putting the government into industry, but only a necessary step to test the scientific methods by which liquid fuel is made from coal and shale and to conduct operations to prove the economic feasibility of the process.

Will Private Enterprise Do the Job?

The time is here for private capital to act. Coal deposits are to be found all over the country and the public demand will soon arise for the construction of government plants if private initiative does not take the lead. The public land states have great coal reserves. My own state, Wyoming, has greater reserves of bituminous and sub-bituminous coal than any other state, and it is only natural that the people of these areas should want to see such resources developed.

The alternatives are plain. We shall have free private competitive enterprise at work making liquid fuel or we shall have government doing it. We shall have it done locally by the coal industry and by the users of coal putting up their own capital to build the plants, or we shall have the pressure continue to have the government enter the field.

When the Defense Production Act was under consideration during the last session of Congress, I appeared before the Committee on Banking and Currency to urge the inclusion of language that would provide government cooperation with private business to stimulate "the expansion of capacity, the development of technological processes, or the production of essential materials" needed for the defense program. The provision was written into the law and it is now possible for the government through contracts for the purchase of materials needed in the national defense to cooperate with private firms and corporations engaged in the production of such materials. This provision, which I urged upon the committee, includes specifically "liquid fuels for government use or for resale." Thus it is clear that by these enactments the way is being cleared for private capital to enter

(*Continued on page* 82)

USBM has demonstrated at its Louisiana, Mo., experiment station that synthesis of oil from coal is practical

Surface mining requires big equipment

Mining Aluminum Ore

★

By EVANS W. BUSKETT
Consulting Engineer

★

Arkansas Bauxite Mined by Surface and Underground Methods Is Important Source of Critical Metal

ALUMINUM is the earth's most abundant mineral, making up 8.07 percent of the earth's crust. Although a pound of aluminum is present in a shovelful of almost any clay, the costs of refining it are prohibitive. It is easily oxidized and so never occurs in a free state but is chemically tied up as oxides, hydroxides, silicates, and other oxidized compounds. The most common aluminum ore is bauxite, an hydroxide, containing 50 to 60 percent aluminum oxide or alumina.

The mineral bauxite was discovered in mineral form by the French chemist, Berthier, at Les Baux, France, in 1821. It was mined there in 1873 according to Pawlawski and was probably used at that time for the manufacture of aluminum sulphate and possibly other aluminum salts. Later it was mined in County Antrim, Ireland. A similar mineral, which has taken the name of bauxite, was discovered in Georgia in 1889, and then in other southern states. The late John C. Branner, who was state geologist at the time, discovered bauxite near Sweet Home, Ark. Metallurgical discoveries by Hall in America and Heroult in France of identical processes for the reduction of aluminum from its oxide by electrolysis led to an increased production of the mineral until it is now mined in great quantities, both in the United States and abroad.

Two minerals which commonly bear the name bauxite are listed by mineralogists: there is the French bauxite from Les Baux which is the aluminum hydroxide, $2Al(OH)_2$; and the American bauxite, which is mainly gibbsite, $2Al(OH)_3$. These minerals rarely occur in a pure state, their principal impurities being oxides of iron, silica, and titanium oxide.

Bureau of Mines' reports for the year 1948 show that Arkansas is the principal producing state in tonnage of bauxite. In fact it produces much more than all of the other states combined. In that year Arkansas produced 1,649,926 long tons while all other states produced a total of 74,511 long tons.

Arkansas bauxite occurs in beds varying from one to 12 ft thick, thinning to an edge, and range from one to 40 acres in extent. The deposits occur in two types; (1) in place on the syenite from which they were formed, and (2) those which have been moved down slope by soil creep and stream action and were formed by the disintegration of nephelite syenite.

Textures vary from granitic to pisolitic. There are fine granite structures resembling the original syenite and concretionary, or pisolitic, structures, which show grains or nodules, simetimes as large as a pea. These grains, or nodules, vary in color from dark red to white and are cemented together with fine material of the same composition. Typical bauxite looks very much like a piece of clay that has had the smallpox.

Prospecting for bauxite is carried on by drilling with hand, auger, bucket, churn, and core drills, or by

Unique reaming bits help in shaft sinking

digging test pits. After a deposit is found the usual practice is to continue drilling until the deposit is outlined and depth of overburden and thickness of deposit is determined.

Bauxite is mined by strip or open pit methods and also underground, like coal. The method of mining to be used is governed by ore assay, depth and characteristics of the overburden, and the size and thickness of ore body. As a "rule of thumb" many operators use a ratio of five tons of waste to one long ton of dry ore as an upper limit of profitable strip mining. Deposits have been stripped to the depth of 100 ft, while others have been mined under cover as shallow as 40 ft.

Fresno scrapers were used in early mining operations to remove both the overburden and the ore. Now, however, bulldozers are used, first to remove brush and trees and then overburden if it is loose and can be removed by them. Draglines carrying up to 10 cu yd buckets may be used if the overburden is too hard to bulldoze.

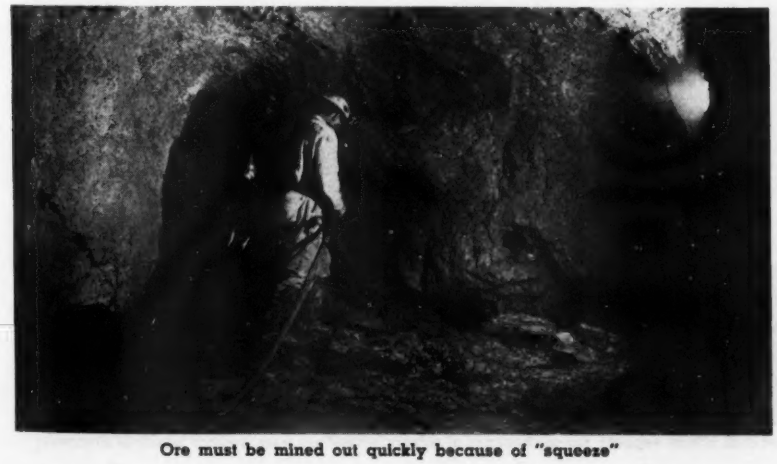
Panel stripping is used in many cases if the ore is to be recovered by surface mining methods. The overburden is removed from a panel along one edge of the deposit and the waste dumped outside the area to be mined. In some cases the overburden has to be trucked away, which of course increases costs. The ore in the first panel is removed and the second panel is stripped, the waste being dumped into the empty first panel. Mining proceeds across the deposit in this manner. Bauxite has to be drilled and shot before it can be loaded out. Holes are drilled with an air drill using a two in. diam. auger bit. These holes are usually spaced 10-15 ft apart and in some cases must be lightly sprung. Power shovels load the ore into one or two long-ton railroad cars or into large trucks which haul it to the drying plants.

Novel Shaft Sinking Methods

Underground mines are generally reached by timbered, concrete, or steel-lined shafts. Because of the prevalence of ground water in Arkansas few timbered shafts are used. Concrete shafts are sunk much the same as caissons, concrete rings being added as the shaft lining sinks.

An interesting method is used to sink a steel-lined shaft. A 16-in. pilot hole is drilled to the desired depth with a conical bit armed with three-in. steel strips. The steel strips are lined on the cutting edge with teeth or cutters of hard steel or stellite. Cuttings are removed with mud which is pumped down the hollow stem of the drill and also lines the hole and prevents caving. After the pilot hole has been drilled a conical bit six ft in diameter is used to ream out a larger hole. This bit has six-in. steel strips also with hard cutting edges and a guide shaft to fit into the pilot shaft and keep the shaft bore as straight as the pilot shaft. As when drilling the pilot hole, the large shaft is kept full of mud to carry away cuttings and keep the sides from caving.

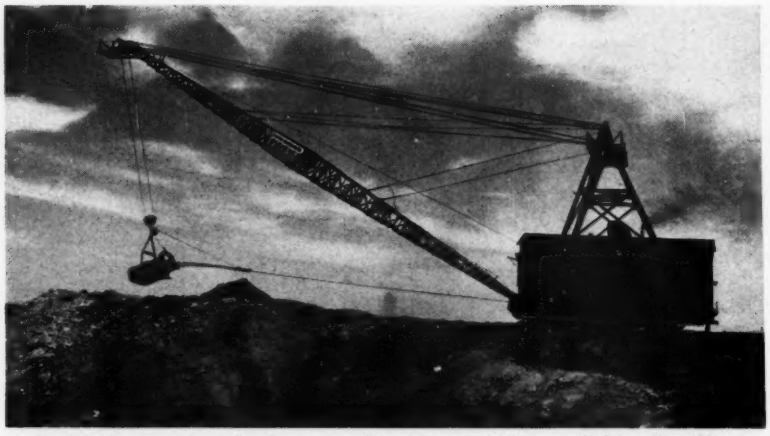
When the required depth of shaft is reached it is lined with steel. A steel casing the diameter of the shaft and about 20 ft long is lowered into the shaft until the top of the casing is near the ground level, whereupon another steel casing is welded to the first and the lining again lowered 20 ft. When the first casing rests on the bottom of the shaft the top casing is fastened at the surface and a four-in. pipe is lowered almost to the bottom. An air tight cover is then welded on the top casing and a pressure of 15 psi is applied to the mud, which still fills the shaft. A grout of cement is then pumped into the four in. pipe and forced up and around the side of the casing. Grout is pumped in until it reaches the surface of the ground and allowed to set for 24 hours. The mud is then pumped out, the cover removed and the shaft is ready for equipment and use. Shafts have been sunk by this method to a depth of 310 ft. Vertical offset varies from only a few inches to as much as 36 in.



Ore must be mined out quickly because of "squeeze"

Haulage Suits Conditions

The deposits are opened up through parallel entries driven from the shaft to the edge of the ore deposit, on 30- to 40-ft centers; cross entries being made every 200 ft for ventilation. Beginning at the far end of the entry the ore is blocked out in 30-ft squares by driving crosscuts. After several of these blocks are made the work of removing the ore is begun on the block furthest from the shaft. A small pillar is left in the center of the block to support the roof. When the mining has progressed to a safe distance from the first pillar it is shot and the roof allowed to fall. Blocks must be re-



Ratio of five tons of overburden to one of ore is upper limit for profitable strip-mining

moved quickly as the bottom oozes up and the roof—if composed of clay or lignite—may slake and cave. For this reason stopes or cross entries are driven only as the removal of the blocks progresses. Up to six in. of ore is left in the roof to prevent caving while blocks are being removed and an ample pillar is left in place around the bottom of the shaft to protect it.

Loading machines are used to fill electrically driven cars or shuttle cars. The electrical cars dump directly into skips at the shaft bottom while the shuttle cars generally dump the ore onto a belt conveyor which takes it to the shaft bottom whence it is hoisted to the surface in self-dumping skips. Loaders and cars will handle about 25 long tph.

Travel conditions for shuttle cars are not good because of the water and mud which ooze out of the bottom. After a few trips roads become almost impassable. Boards are used to lay solid roads but as the mud oozes out between them difficulties in traction are encountered. The use of conveyors alleviates this condition somewhat as the hauls can be kept shorter when the conveyors follow close to the working places. In one mine the ore dips at an angle of approximately 15 deg. To build a roadway up the slopes on which the rubber tires of a shuttle car will have traction, straw is used as a paving material.

Ore Classified for Buying

According to figures from the Bureau of Mines bauxite for the Bayer process of preparing alumina for smelting, must contain more than 32 percent alumina ($Al_2)_3$) and should contain as little as 8 percent silica. Oxides of titanium are present, but seldom does the titanium content of bauxite exceed 4 percent.

The following figures on classification of ore for buying are given by the Bureau of Mines as a basis for the paying of premiums or the exacting of penalties.

Classification of Ore for Buying

Premiums

For each percent alumina above 50 percent.... 14 cents.

For each percent silica below 13 percent..... 20 cents.

Penalties

For each percent alumina below 50 percent.... 14 cents.

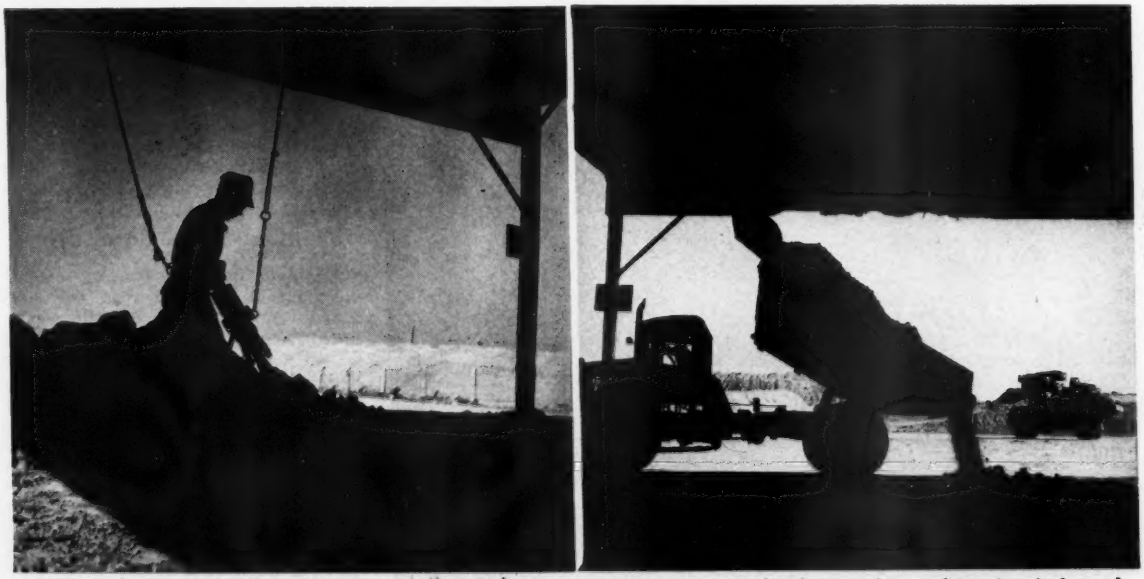
For each percent silica above 13 percent..... 43 cents.

Royalties on ore range from 50 cents to one dollar or more depending on the thickness of the deposit, the analysis of the ore, and the depth and character of the overburden, being naturally higher for the higher grade and more accessible ores.

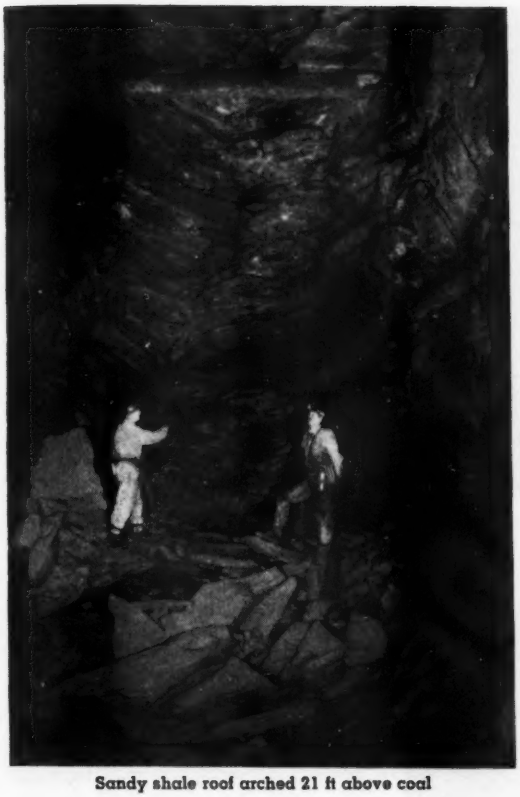
Wide Range of Uses

The greater part of the bauxite mined is used for the production of metallic aluminum; however large quantities are used to produce alumina in a number of forms. Fifteen grades of alumina are made with as many varying properties to fit a broad field of industrial uses. Hard materials such as stainless steel and chromium plate are polished with the aid of alumina. High temperature refractories like those used in high grade brick and forms for melting furnaces, airplane and automobile spark plugs and bedding in the heat treatment of special alloy steels take more of the alumina production.

Activated alumina valuable for its ability to absorb water from gases, vapors, and liquids is used commercially for air conditioning, maintaining transformer and lubricating sand, and as a catalyst.



Safety precautions include belt on operator and chain support for air hammer at grizzly where ore from surface mines is dumped



Sandy shale roof arched 21 ft above coal

Main Entry Development in Low Coal

Slating and Grading Controlling Factors in Rate of Advance

By W. D. HAWLEY
General Superintendent
Eastern Gas & Fuel Associates

THIS paper is based on methods of main entry development of the Pocahontas No. 4 seam in the Winding Gulf Field of southern West Virginia. The coal in this area varies from 30-42 in. with an average seam height of 34 in. The seam dips approximately three percent to the northwest and the main entries are driven on the dip with haulageways being graded to three percent against the loads. There are severe undulations in the seam, more or less in the form of terraces on approximately 1000-ft centers where 11 percent grades are encountered.

Headings Driven in Pairs

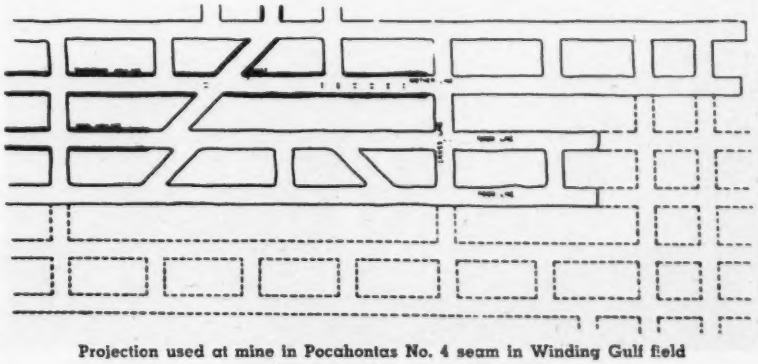
Main entries are developed on a six entry system. The four outside entries are prepared for return duty, while the two at the center are used for intake air and haulage. At one mine the grades on the main line haulage make it necessary to slate the No. 2 entry with the coal seam for temporary haulage while the grading is being done on the main entry for permanent track. At other mines where the amount of rock to be taken is not so great, only the main haulway is slated.

Main entries are usually developed in pairs in 320-ft runs using chain conveyor equipment. Occasional runs of 640 ft and 960 ft have been made when additional conveyor equipment is available. Major equipment used in this set up consists of two shortwall cutting machines, two electric coal drills, three room conveyors, one face conveyor, one mother conveyor and one car spotting hoist. A foreman and a seven-man crew (two machine men, four loaders, and a boom man) is employed. The loading point is in the temporary haulage entry, where the mother conveyor is usually suspended from the roof to provide car storage space. Loading points are supplied on the pull and place system by the motor crews. Under favorable conditions a 320-ft run has been developed in 16 days with two shifts or an average of 20 ft of advance per day.

Bottom Grade Bolted Areas

Bottom grading is used when at all possible to leave undisturbed the sandy shale top. This is weak in shear and if disturbed about 1½ ft of it falls for every foot of width. It is extremely important to install support immediately if the top is shaken. At one point an arch extending 21 ft above the coal was formed when this shale fell.

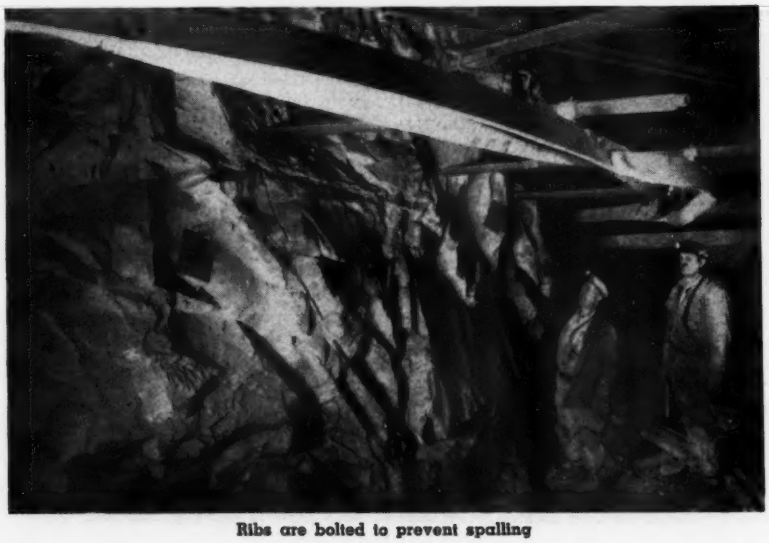
In roof bolted areas bottom grading



Projection used at mine in Pocahontas No. 4 seam in Winding Gulf field

Two lifts taken below coal bring heading to grade

Roof bolting makes bottom grading a must



Ribs are bolted to prevent spalling

is a must. In all entries where bottom grading is to be done four-in. channels weighing 4.2 lb per ft, 12 ft long with eight holes for roof bolts are installed on four-ft centers. The channels are secured with four 36-in. bolts as the coal is extracted. If necessary later on, four 80-in. bolts are placed in the remaining four holes for reinforcement as the grading work progresses. Where it is necessary to take top rock, four hole channels and bolts are installed as soon as the rock is brought to grade.

Cut and Fill Required

At times due to the undulations in the seam, previously mentioned, cuts of five-17 ft and fills of up to 18 ft must be made to maintain the three percent grade in the entries. Such work requires the handling of a 21-ft rock face. In such work the rock is removed in several lifts with roof bolts installed as soon as the broken material from the first lift has been removed. In deep rock cuts the ribs are also bolted to prevent spalling.

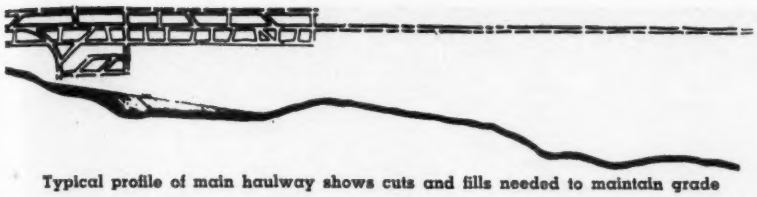
In one instance a cross main 4800 ft long was driven along the strike of the seam to connect two main entries. In driving this entry no attempt was made to establish a uniform grade. The maximum grade was three percent with level places at several points along the way. Two headings were driven, one graded for haulage and intake air. This provided an effective area of 90 sq ft. The second was bottom graded to provide a return air course with the same effective area. No effort was made in this latter heading to establish grade, other than to follow the bottom of the coal seam.

Mechanical Methods for Rock Handling

For the grade work development, mobile rock loading machines and scraper loaders are used. Each loading machine is manned by a crew of three men, an operator, motorman and brakeman. The rock foreman in charge may have two or three rock crews under his direction. Each loading crew drills, shoots, loads and hauls out the rock, sets the permanent timber and installs roof bolts, as well as the temporary and permanent track.

Drilling is done with drifters using standard 1⅛-in. round drill steel in changes of eight and 14 ft for a 12-ft hole. Carbide tipped bits have superseded the conventional throw-away bit. The four-point carbide tipped bit gives twice the depth and 25 percent faster drilling than do chisel-point bits. Compressors and piping are located to provide 80 psi air pressure at the drill.

There are several different methods for mounting the drifters. A special



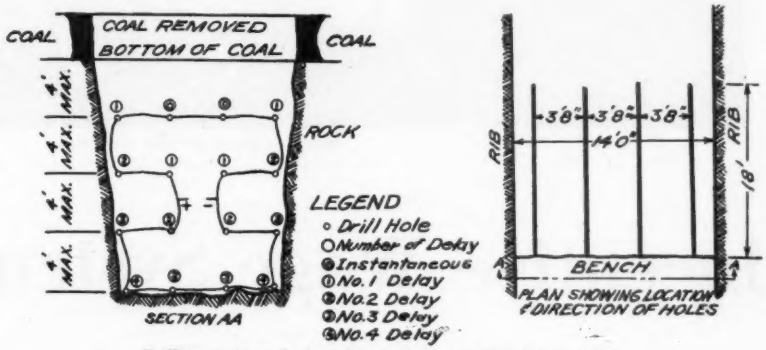
Typical profile of main haulway shows cuts and fills needed to maintain grade

drill car with arms that are raised and lowered hydraulically has been developed to mount two of the standard drills. A second method employs a 13-17 ft air operated drill bar which is extended horizontally to the ribs of the heading to provide support for one or more drifters. A third type is a shop built car on which a single hydraulically operated adjustable arm is mounted.

Blasting Pattern Flexible

Permissible Gelobel AA is the standard explosive used on all rock work. All shots are connected in series-parallel circuits and fired with permissible batteries. The hole pattern for heavy lifts of bottom rock consists of four rows or four 12-ft holes spaced three ft eight in. apart horizontally and four ft apart vertically below the coal seam which has been removed previously. Zero, one, two, three and four-delay detonators are used to cause the shot to pull away from the ribs and face. The pattern is fired with the instantaneous caps in the two top center holes. These break to the opening formerly occupied by the coal. The number one delays fire next from the rib holes in the top row of holes and the two center holes in the second row. The outside holes in the second row and the center holes of the third row follow with number two delays. The center holes of the bottom row and outside holes of the third row are fired with number three delay detonators and the two remaining rib holes in the bottom row are detonated with the number four delay caps. For lighter grading any combination of one or more rows of the above pattern is used.

Broken rock is loaded out with Myers-Whaley mobile rock loaders or Joy scraper loaders.



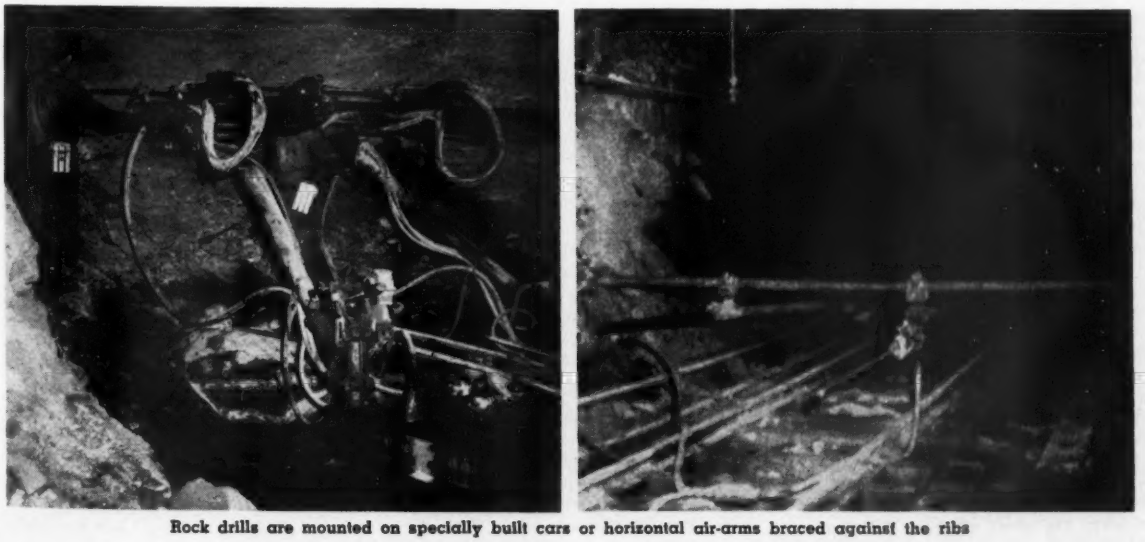
Drilling pattern designed to pull away from ribs and face

Roof Bolting Expedites Work

During the past four years at one mile 30,122 lin. ft of slating has been done in entries 14 ft wide. This includes main headings, sidetracks and butt headings where track haulage is used. The total labor cost involved was $440,491.82 or an average of $14.62 per lin. ft of advance. In some entries the labor cost per lin. ft for grading ran as high as $35.00. The average labor cost over the last four-year period was $3.95 per cu yd of rock. Per ton of coal produced, average labor cost for this grading for the same period was $0.28. The total coal tonnage produced was 1,593,237 net tons compared to 114,593 cu yds or 271,585 tons of slate handled in the slating and grading projects.

Roof bolting as the coal is developed, high speed air drilling, and multiple shooting with delay detonators, have expedited the rock development tremendously by cutting the idle time of the loading machine to a minimum.

Main entry development in low coal is not solely dependent upon the rate of advance of the coal face, but upon the rate at which the slating and grading follows. When this development can approach a single operation rather than two separate operations, or when the coal and rock can be developed simultaneously, control over the rate of development can be attained.



Rock drills are mounted on specially built cars or horizontal air-arms braced against the ribs

Incentive plans develop teamwork

Incentive Wage Systems Increase Labor Efficiency

Worker and Management Benefit from Increased Production, Lower Unit Costs

By JOHN G. HALL
Eureka, Utah

IN the United States most economic activities are still carried forward under a scheme of private enterprise. The established way of measuring material goods and services is through the medium of exchange-money. Basically, time-wage places no emphasis on output, and makes no reward for unusual effort. The incentive form of wage, on the other hand, places no emphasis on time, but provides for increased earnings for increased output. Incentives may be placed on quantity, quality, material saved, or any combination of these. A properly designed incentive will decrease costs and increase earnings. Both employer and employe gain. In general it can be said that any incentive wage payment plan that reduces unit labor cost will also reduce the unit overhead cost. More work will be done by the machine or process, and the overhead cost of operating will be prorated over a greater number of units of production so the unit cost will be lower. In any situation the art of the use of incentives is to pick out and apply, in proper measure, that plan which will invoke the response wanted. Where alternatives are available the least costly plan represents the most efficient selection.

Primary reasons for wage incentives are to get lower unit costs, and to improve the earnings of the employes. Records show that incentive plans have cut costs 20-50 percent and increased wages by 30-300 percent.

These are the essential characteristics of a good incentive system:

(1) It should be just to both employe and employer.
(2) It should be strong both ways; that is, have a high standardized task, and a generous reward for effort.
(3) It should be unrestricted as to the amount of earnings.
(4) It should be reasonably simple for the employe to figure his bonus. Some systems are too complicated. It is necessary that the employe feel certain that his earnings are accurately determined and that the whole matter is being handled in an open and fair manner.
(5) It should be flexible, and intimately related to other management controls.
(6) It should automatically assist supervision.
(7) It should have the support of both management and employes.
(8) It should not be used as a temporary expedient to do rush jobs and then dropped during normal operation as a means of reducing wages.
(9) Its standards should not be changed unless there are important changes in economics of the operation, or changes in methods, equipment, or conditions on the job. Such a guarantee to the worker insures him he will not be cut merely because his earnings are too high.

If an incentive plan has these characteristics its successful operation will be possible.

Individual Incentive Best

Incentive plans may be applied separately to individual employes, or may be used to cover groups of employes. Experience shows that if group incentives cover large groups, individual incentive will be lacking. Plans limited to relatively small groups of employes have several advantages:

(1) They develop a spirit of cooperation and teamwork.
(2) They induce skilled workers to help beginners and the slow employes.
(3) They save clerical work.
(4) They promote alertness on the part of members of the group.
(5) They simplify cost determinations.

These principles were the basis of the incentive plan inaugurated in 1941 at the Chief Consolidated Mine at Eureka, Utah, by Cecil Fitch, Sr., company president. The plan has operated successfully for the past nine years with approximately 95 percent of the underground force participating in some nine basic types of plans covering practically all kinds of work. This plan, with full cooperation of all employes, has made possible a reduction in costs, which was necessary to insure continued operation in the face of a stormy metal market. As mining procedure has been improved by replacing the "muck stick" and wheelbarrow with the mechanical mucking machine and slusher hoists, the mule and hand-trammer with the battery locomotive, hand-crank leyner and bar with automatic leyners and hydraulic jumbos, the employes and the company have shared the savings made possible by the efficient application of this modern machinery.

Today, 51 separate plans are in effect and cover all stoping development, shaft sinking, shaft repair, haulage, hoisting, caging, diamond drilling, and other special operations. Each plan is a verbal agreement made between the company and employe. The verbal agreement is then reduced to writing, for the purpose of record. Each individual plan is known as a contract, and earnings are calculated semi-monthly. All contracts covering any one particular type of work are identical except for the "base," or standard task requirements, which are varied to meet conditions encountered in each particular working place. Special allowances for extra work are also granted where work is performed beyond the requirements of the contract. Wages compatible with local wage scale are guaranteed in all cases. All underground employes, except hoistmen and shaftmen, are guaranteed the same basic wage which at present is $10.85 per eight-hour shift.

How System Works

Contract calculations are based on production records or on engineers' measurements, depending on the type of contract. All ore and waste are loaded underground into one-ton mine cars, and transported to the surface. The car-hoisting system aids in proper segregation of some ten or more different classes of ore being mined, and also makes possible the simple and accurate accounting of tonnage produced by each working place each day. Every mine car is tagged at the working place by the miner or motorman who has loaded it. The tags indicate the working place from which the car was produced and also the class of ore or waste. The number of cars reported hoisted to the surface each day by the topmen is crossed-checked against the daily car reports submitted by the motormen, underground hoistmen, and by the miners

Plan is most effective when applied to individuals or small groups

themselves. The number of mine cars that have actually arrived at the surface during the 15-day period is always used as the basis for calculating stope contracts. This car-count system has proved to be surprisingly accurate. A copy of the daily hoist record is posted each day near the shaft collar and any discrepancies are reported by the employes involved and immediately corrected. Penalties are invoked by the supervisors for cars not fully loaded and a yearly average indicates that cars are filled to an approximate 99 percent capacity. At the end of each two-week period footage measurements and records of other work performed, such as timbering, machinery installation, and repair work, are made by the mine engineers in the presence of a supervisor and the employes concerned. Disagreements, if any, on measurements are settled immediately at the working face. Contract calculations are made the following day by the chief clerk, checked by the mine office staff, and approved by the superintendent. The employes have the privilege of seeing the calculations if they so desire. Earnings are then posted to the payroll sheets.

Stope contracts cover all stoping operations and are based on quantity of ore produced per man-shift during a semi-monthly period. For the most part, stopes are untimbered and open with occasional stulls. Two men make up the usual stope crew. Slushers or mucking machines are used to load the ore into mine cars, or it may be broken directly into chutes. Since the contract is based upon *quantity* of "approved material," it is the responsibility of the supervisors to keep a close control on the *quality* of the ore. There is always a natural tendency on any tonnage contract for excessive dilution. This is watched very closely. A standard task or base of a certain number of mine cars

Contracts cover all stoping operations

per man-shift is established for each individual stope to equal basic wages. For each mine car produced in excess of the base a bonus of 70 cents per mine car is paid. The bases vary from 6 to 11 mine cars per man-shift, depending upon stoping conditions. Bases are established by the mine superintendent who makes all the contracts with the employes. The contract includes drilling, blasting, and delivery of the ore to chutes or into mine cars, and all other usual work connected with the stoping operation. Special allowances are made for construction of chute mouths, installation of slushers and ventilating fans, and other special work. Allowance for tramming ore over a specified distance is also allowed where stope crews deliver the ore to a shaft station or a switch.

Calculation of Earnings

Calculation of earnings is simple. For example, if a stope with a base of seven mine cars per man-shift has produced an average of 12 mine cars per man-shift for a semi-monthly period, there have then been five cars per man-shift in excess of the base. The bonus is then 5 x 70 cents or $3.50 per man-shift in excess of the basic wage of $10.85. This equals a total earning of $14.35 per man-shift. Under this system the average production of stope crews for 1950 has been 8.8 cars per man-shift. A close control is maintained at all times by the supervisors on carloading and dilution at each stope.

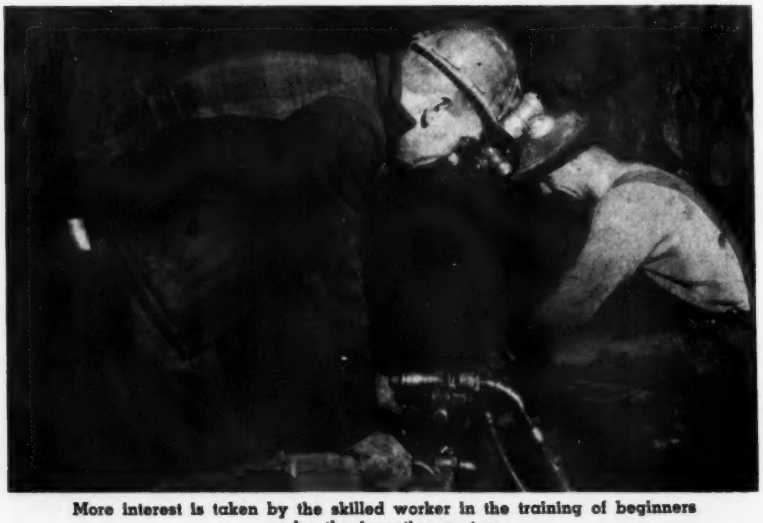
Footage contracts cover all drifting, raising, and shaft sinking operations. Drifts are generally untimbered and are approximately 5½ by seven ft. The contract covers all phases of the operation including pipe installation, ventilation and track work. Contracts are based upon payments of from $5.50 to $6.65 per ft advance. The price is dependent upon working conditions, such as water flow and length of tram to dispose of broken rock from headings. Where timbering is necessary it is paid for at the rate of $14 per drift set. If the two-man crew has averaged 6 ft per crew-shift or three ft per man-shift in a drift paying $6 per ft, then the earnings will be 3 x $6 or $18 per man-shift. Under this system the advance per crew-shift for all drifts averages six-seven ft. The depth of round drilled depends mainly on the length of time required to dispose of the broken rock from the previous blast.

Small Groups Build Teamwork

The hoisting contract at the mine shaft is an example of a small group contract that has functioned very successfully. There are a total of 20 men participating in this contract. This is considered the largest number of men feasible for successful participation in any one contract. Actually, there are but six men working on the contract each shift, the balance being the substitutes necessary so that no man works more than five days per week while the hoisting is on a seven-day-per-week, two-shifts-per-day basis. Participants include the hoistman, the cagerider and helper, two topmen, and a truck driver. The contract covers the entire operation from caging cars underground, to delivery of the ore to railroad cars, disposal of waste, and lowering of men and supplies. A base of 65 mine cars for each topman and truck-driver-shift must be hoisted to allow basic wages for each participant. A bonus of 29 cents per car in excess of the base is divided among the participants in proportion to the number of shifts worked by each. If an average of 300 mine cars is hoisted per working shift, with two topmen and one truck driver working, then the base is 3 x 65 or 195 mine cars, leaving 105 bonus cars. The total amount of bonus money is then 105 x 29 cents which equals $30.45. Then the bonus per man-shift is $30.45 divided among six participants, or $5.07 per shift, a total earning of $15.92 per man-shift. This group contract is small enough so that individual effort is not obscured, and has produced excellent teamwork among this group.

Contracts covering tramming, diamond drilling, and all other operations are basically the same as the contracts discussed above.

For the purpose of simplifying the explanation and description of this contracting system, the basic standard tasks used as examples are adjusted to compare with the basic wage rate of $10.85 per day. Actually, however, at the present time, the contract base rate is not $10.85, but is $9. This differential has arisen gradually since 1941 when basic wages were $7.45, and the contract base rate was $7.45. As the wage scale has increased to $10.85, the contract base rate has not been increased in direct proportion for two reasons. The first of these is the attempt to keep over-all costs down in the face of rising wages. The second is complete divorce of the contract system from the local wage scale, thus keeping the contracting system entirely apart from union negotiations.



More interest is taken by the skilled worker in the training of beginners under the incentive system

Employe Earnings Increased

This incentive system has functioned to increase the tons mined per man-shift, to increase footage advance per man-shift, to increase the earnings of the employes, and has lowered unit costs. It has aided in developing an excellent spirit of pride of workmanship and output among the employes. Earnings of the employes have averaged approximately 40 percent above basic wage with many cases of 200 to 300 percent above basic wage. As the basic wage scale has increased from $7.45 at the inception of the plan to the present $10.85, it has been a difficult task to adjust contracts fairly in such a way that incentives could be offered without having costs climb too steeply. This has been accomplished by the introduction and efficient use of improved mining equipment and improved mining methods, and by increasing the contract base rate from $7.45 to $9 instead of the existing wage of $10.85. In the case of footage contracts the use of improved equipment has made it possible to reduce costs and yet offer attractive incentives. Today both employe and employer are benefiting from the plan and each supports it 100 percent.

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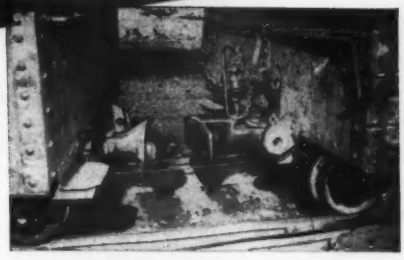
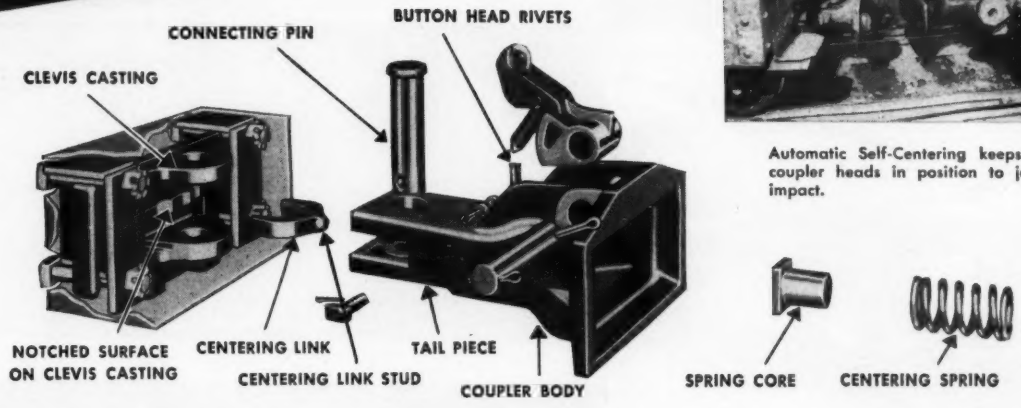


Automatic Self-Centering keeps these coupler heads in position to join on impact.



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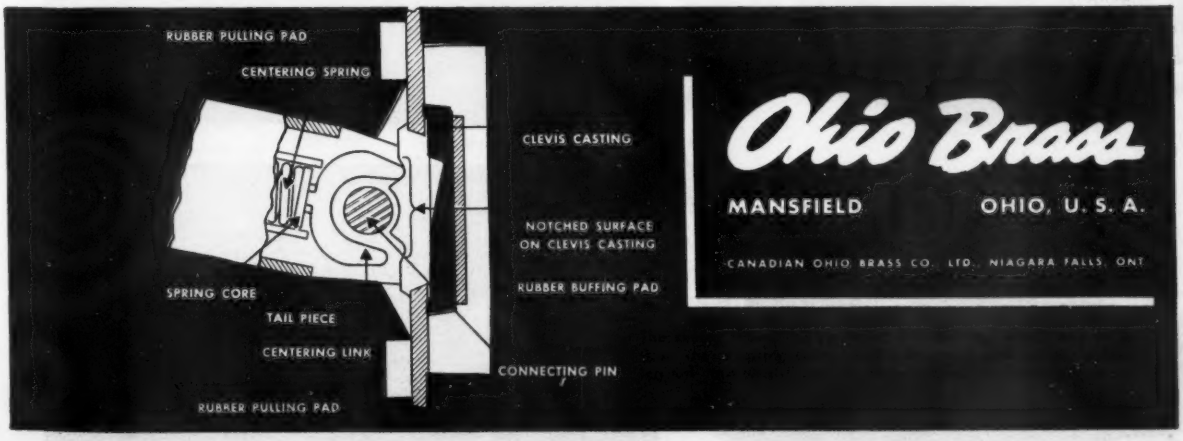

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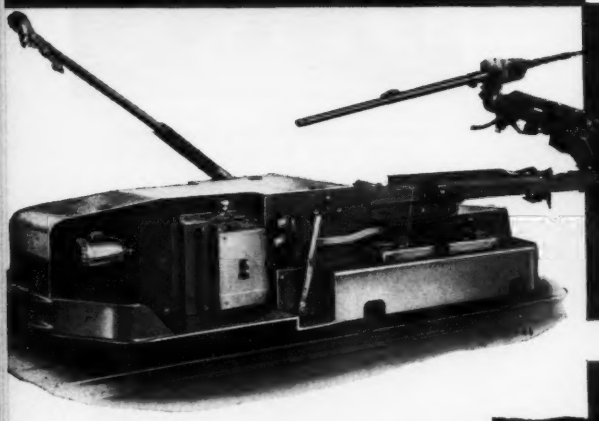

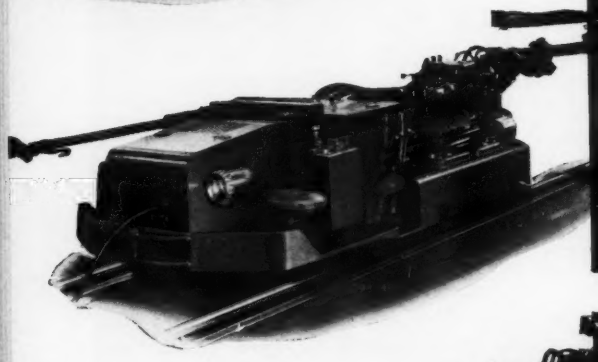

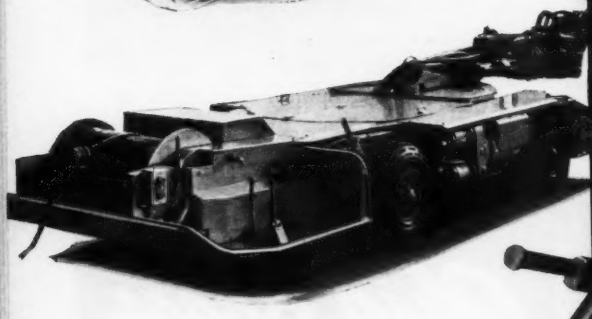

View above shows the Jeffrey 56-FHR Drilling Machine described on the opposite page (third one down). It is completely hydraulic in operation—will do a modern drilling job in trackless mines. Its many adjustments afford the utmost flexibility and permit proper placement of shot holes. There is a drill or drilling machine in the broad Jeffrey line to do your drilling job exactly. May we hear from you?

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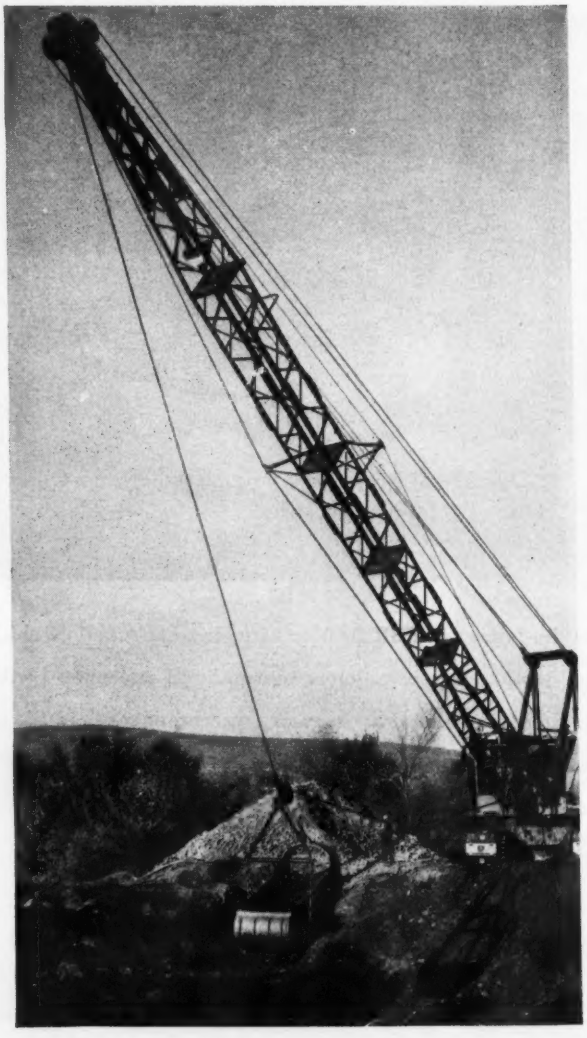

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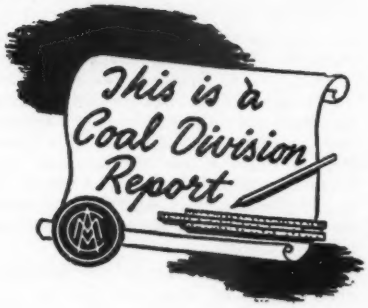
Rail Joint Welding



A report of the Haulageroads Committee describing several processes of rail welding for coal mine tracks, giving methods, costs and service records

A. E. BELTON
V. D. HANSON
J. S. GELSTON
H. O. ZIMMERMAN
Subcommittee on Rail Welding

IT is generally agreed that a bolted rail joint is the weakest part of the mine track, in structure and in maintenance. The life of the rail is dependent in most cases upon the life of the joint as the latter usually reaches a condition that compels replacement of the rail long before it is worn out. Much time and study has been spent on designing various types of rail connectors. Welding is the most successful method so far developed to overcome the structural and service weaknesses of the conventional bolted joint. The method is especially suitable for track on main lines and other long-life mine haulage roads.

Perhaps the greatest advantage of welding is reduction of electrical resistance when the rail is used as one conductor in the power line. The gap between rail ends forms a definite break in the circuit with bolted joints. It has been standard and necessary practice to bridge this gap with one or more copper bonds at each rail connection. These are expensive to install and maintain. Engineering studies show that three 4/0 copper bonds are required on a 60-lb rail joint to provide a conductive value equal to that of a welded joint, assuming the three bonds are maintained in good electrical condition at all times. Adequate carrying capacity in an electrical circuit is always a matter of prime importance. Power losses from line resistance are costly and wasteful, particularly when dc line voltage is restricted to 250 v. The advantages of rail welding are summarized below:

(1) Welded track provides a smoother roadway for locomotives and cars, thus reducing vibration, lessening coal spillage, and wear and tear on motor housings, mine-car wheels, axles and bearings.

(2) Welding eliminates trouble from low or loose rail joints.

(3) Welding reduces track maintenance since there are no angle bars, bolts or copper bonds to be replaced. There is also less general road maintenance because welded track is more rigid and requires less resurfacing.

(4) Welded track permits safer and faster haulage. In some cases, main line haulage speed has been increased 50 percent with an improved safety record.

(5) Welding compares favorably in cost with bolted joints, including all labor and material in each case.

Welding Gains Acceptance

With increasing pressure for higher performances in all phases of mine operation, rail welding is fast becoming accepted practice in coal mining. The several welding processes in use—electric, bronze and thermit—are basically similar although each has its own special technique as described in the following accounts of actual installations. In presenting this report the committee wishes to state that the cost data are not intended to indicate relative or typical differences between the costs of welding by these three methods. The figures show the results at four mines in three states but installation cost is always dependent on outside factors that vary in different localities. At all these operations the consensus is that welding is best performed during periods when the haulageroad is out of service. This might mean, in some cases, labor would be paid at the "sixth day rate" but in each of the following reports the labor is figured on straight time to make the figures at the different mines more comparable. Materials are at January 1951 prices; general overhead, vacation, welfare funds, taxes, etc., are not included.

Bronze Welding

Bronze welding requires a two-man crew, a welder and a helper. The equipment consists of an oxy-acetylene welding and cutting outfit, suitable bronze welding rod coated with flux, and steel plates. A small electric grinder with a wire brush is a great time saver for cleaning the rail ends, although a hand wire brush will serve. The complete outfit is portable and is used at the immediate site where the joint is to be welded.

Preparation is an important factor. The rail ends are beveled with a cutting torch to form a 60-deg angle from the horizontal on each rail. This can be done either before or after the rails have been placed in position. Next, the rails are properly aligned and

Fig. 1—Steel plate is wider than rail flange

Fig. 2—First weld bottom plate to flanges between rails, then adjacent flanges

leveled. A ⅜ by 7 by 12-in. steel plate is placed directly under the joint of the rail and held in position with clamps. This plate serves two purposes: (1) to increase the strength; (2) to serve as a back-up for starting the weld when the rail ends are spaced too far apart. In old track, wide spacing is quite often encountered but ideal spacing between rail ends is approximately ⅛ in. and not to exceed ¼ in. The rail ends must be thoroughly cleaned.

Fig. 1 shows the proper spacing and alignment required for bronze welding. Note that the steel plate is approximately ½ in. wider than the flange of the rail and is placed immediately under the joint. The exposed plate and rail surfaces should be free of all loose scale and dirt. It is also important that good alignment be maintained between the rail ends by suitable clamps. The joint as illustrated has been properly prepared for welding by beveling and the V at the intersection of the web and flange has been widened to permit bonding with the steel back-up plate.

Figs. 2 and 3 show a partially completed joint where the sequence was first to weld the bottom plate to the flanges between the rails and then to weld the two adjacent rail flanges. The weld is continued up the web to the root of the ball and the procedure is repeated on the reverse side of the rail. Upon completion of this stage, the ball of the joint is welded as shown in Fig. 4.

TABLE 1

BRONZE WELDING

85-lb Rail with a Two-Man Crew. Cost per Joint, Based on 200 Joints	
Bottom plate	$ .55
Flux-coated rods	1.55
Acetylene and oxygen	1.25
Total material	$3.35
Labor @ $15 per shift	3.00
Total cost per joint	$6.35

TABLE 2

BRONZE WELDING

85-lb Rail with a One-Man Crew. Cost per Joint, Based on 200 Joints	
Bottom plate	$ .55
Flux-coated rods	1.55
Acetylene and oxygen	1.25
Total material	$3.35
Labor @ $15 per shift	2.50
Total cost per joint	$5.85

TABLE 3

BRONZE WELDING

60-lb Rail with a Two-Man Crew. Cost per Joint, Based on 500 Joints	
Coated rods, gas, plate	$2.25
Labor @ $15 per shift	2.90
Total cost per joint	$5.45

Fig. 3—Build up web to root of ball and finish by filling bevelled area

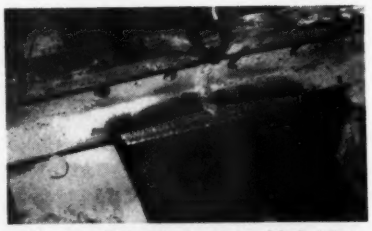


Fig. 4—Finished bronze-welded joint

Fig. 5—Expansion joint is easily made with cutting torch

The majority of the welding at this mine has been on underground track where uniform temperatures eliminate any concern over expansion or contraction. However, there has also been a considerable amount of outside track welded where it has been necessary to consider expansion and contraction. Fig. 5 shows an expansion joint designed to overcome this problem that can be safely prepared with an oxy-acetylene cutting torch. No welding is involved.

Some bronze welds at this mine have been in daily service for as much as ten years with no indication of failure. The ball section of the weld maintains its shape and has no tendency to mushroom, except to conform with the height of the rails. Therefore, it is not necessary to grind the excess material off the top of the rail as the first few trains passing over the joint will make it relatively smooth. Several studies were made to determine the actual cost of bronze welding and the results of these studies are given in Tables 1, 2 and 3. It was observed that two men operating under normal conditions could weld ten joints in a shift while one man working alone could weld six joints.

Electric Welding

This method for rail joints has been used for over four years at the mine described in this report. It has proved highly successful in tracks laid with 60- and 85-lb rail. During the four-year period from September 1946 to December 1950, a total of 1300 welded joints were made in 20,000 lin. ft of track and to date (January 1951) no failures have been reported. Costs are given in Table 4.

Fig. 6 shows the details of the weld, while Figs. 7 and 8 show the design of the bottom plates used under the joints. The "cut out" is made because it was found that if the plate remained whole, much of the stress was concentrated with the result that the rail would break. By stealing a leaf out of airplane design and reducing the section, the high stress conditions were relieved. The accurate measurements shown on the drawing are carefully followed; these dimensions, which are the result of calculation and many trials, are evidently correct as there have been no joint failures since this plan was adopted. The welding process is as follows:

(1) Match ends of rail leaving ¾-in. gap. Spot-weld the mild steel bottom plate to edge of base of rail on both sides, centering plate on gap and rail. Use 5/16-in. rod or equivalent. Spot a 1 by 1 by ¼-in. bar *on each side of rail under gap* in the ball. This is

to form a base for the weld metal applied to the ball.

(2) Weld the gap in the ball, the gap in the base, and the base of the rail to the plate under the rail using one rod *alternately* on the base and on the ball until completed. When welding the gap in the base of the rail run the beads from base edge to opposite base edge alternately on opposite sides of the web. Weld two complete beads on edge of rail to plate in direction of arrow starting ¼ in. from end of plate, applying beads alternately on opposite sides of rail and gap. No. 1 beads (see sketch) should be completed throughout before starting No. 2 beads. When welding do not burn into base of rail more than necessary to give a good bond. When welding the ball, weld up the gap by successive beads with the same rod.

TABLE 4

COST PER JOINT FOR ELECTRICAL RAIL WELDING

	60-lb Rail	85-lb Rail
Welder @ $15.86 per day	$2.65 (6 joints)	$3.17 (5 joints)
Welding rods	.42	.50
Plates before cutting	.39	.60
Cost per joint	$3.46	$4.27

NOTE: To the above would have to be added the cost of cutting the bottom plates (see Figs. 7 and 8). This is done from a template at various times by an outside lower-rate man.

Do Not Weld Up Web of Rail

(3) Peen the weld in the cut while the last bead is hot until it is smooth and uniform with the rail head on each side. Grind the top of rail to provide smooth track surface.

Thermit Welding

The thermit weld is made by pouring superheated steel obtained by the thermit reaction into a mold surrounding the rail ends at the joint. This superheated steel melts all the parts of the rail section with which it comes into contact, and on cooling solidifies with them into a homogeneous weld. An insert made of rolled steel of the same analysis of the rail is placed between the rail heads at the running surface and the lower and back parts of this insert are fused into the molten steel. The mold is so constructed, however, that the head of the rail and the top part of the insert are not melted, but are merely brought to a welding heat, the result being a butt-weld between the sides of the insert and rail heads due to the pressure exerted upon them by the expansion of the rail from the intense heat in the weld and the contraction of the molten

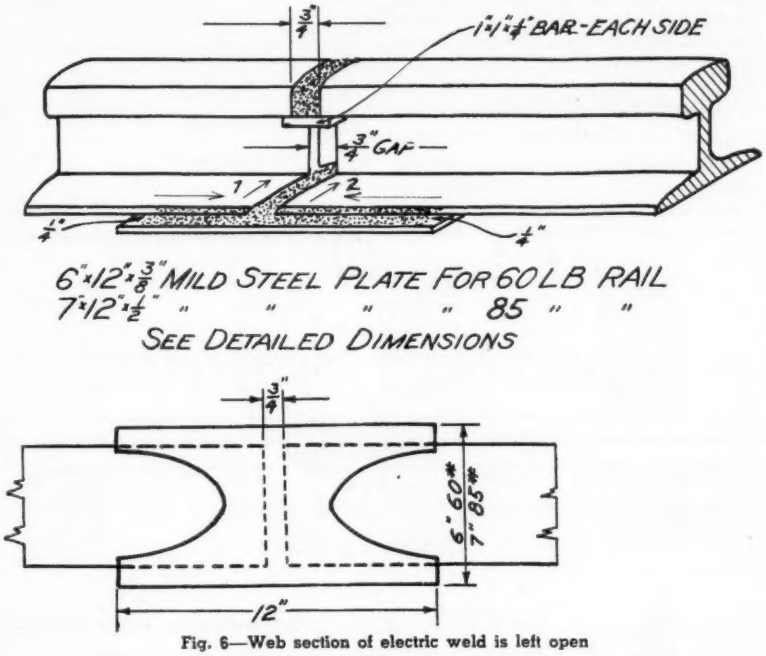
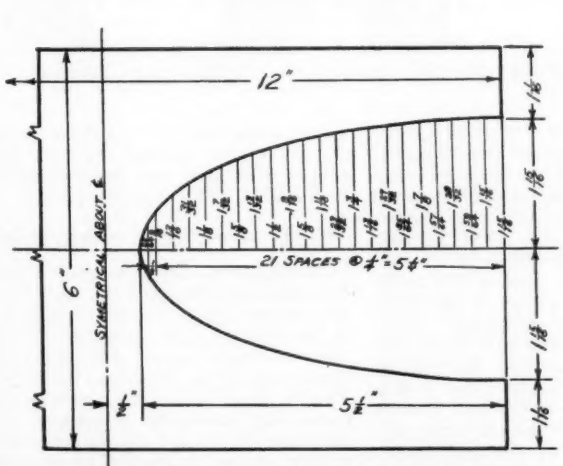
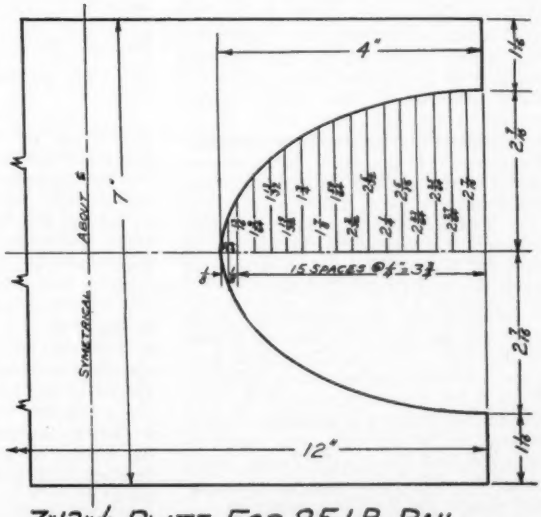


Fig. 6—Web section of electric weld is left open





Figs. 7 and 8—High stress concentrations relieved by reducing plate section in electrically welded joint

TABLE 5

THERMIT WELDING COST FOR 60-LB RAIL

	Cost per Joint
Welder and helper at $16.28 each per day	$5.43 (6 joints/day)
One thermit unit complete	2.72
Cost per joint	$8.15

steel. When the weld has been completed, the running surface is trimmed with a chisel or cold cutter and the joint is ready for service.

Sequence of the Thermit Operation

First—Remove dirt from under rail not less than six in. deep and seven in. on each side of the joint.

Second—Remove angle bars or fishplates and clean rails thoroughly for a distance of about four in. from each end. This can be accomplished by wire brushing. To insure a good weld the ends of the rail heads must be perfectly clean and bright and if necessary filed smooth where they come in contact with the insert.

Third—Put clamps and adjusting bolts on and insert the spacer between the rails. The spacers or inserts are two in. long, ⅞ in. wide, and ½ in. thick.

Fourth—Align the rails, level the joint, and tighten the adjusting bolts in order to eliminate, as far as possible, contraction stresses in the welded rail, and to make certain the insert will be held as tightly as possible.

Fifth—Apply the mold on rails. This is a mixture of sand and clay made in two parts with a vertical parting face, the dividing line being in the center of the rail web with one part representing the inside and the other the outside of the base, web, and lip of the rail. The pouring gate is positioned so that the metal enters the mold at the bottom of the groove, or just inside the gauge face. After the molds are placed on the rail a small amount of molding material is packed hard underneath the luting strips, which are on the inner sides of the mold boxes following approximately the contour of the rails. Molding material is also packed tightly under the riser pattern until the box is filled. The nozzle of the preheater is placed in the hole provided on the inside rail base of the pattern and heat applied until the rail is cherry red.

Sixth—While the preheating is in progress, the crucible should be placed in position. This is a magnesia tar-lined receptacle which holds sufficient thermit for a perfect weld on the rail section for which it is designed. When preheating is complete, the nozzle is removed and the preheating hole plugged. The vent rod is then removed and the vent hole plugged.

Seventh—When the preheating is almost completed, about ½ teaspoonful of ignition powder is placed on top of the thermit, thus starting the thermit reaction. When the reaction is complete (about 15 to 20 sec.), the crucible is tapped by striking the tapping pin sharply upward with the tapping spade provided for the purpose. After five minutes, remove the molds and trim the running surface of the rail with a chisel. The rail is now ready for service.

Combined Welding and Bolting

The somewhat unconventional rail joint described in the following account was designed by a coal mining company for a main-line haulageroad and is the result of a number of experiments carried on for several years. In the opinion of the management, the method combines the advantages of bolting and welding; it is unusually rigid and it has been found by test that the electrical efficiency of the joint is better than that of the solid rail. As shown in Figure 9, the joint is made by a ½-in. steel plate, about 8 x 20 in. under the rail ends and spanning across two ties. The rail is spiked to the tie through holes in the plate and the base of the rail is also welded to the plate; the rail ends are not welded at all, but are held firmly in place with half-length bolted splice bars.

The procedure for installing the joint is as follows: The track crew, in the normal laying of the track, places the base plate, which is punched suitable for the particular rail being used, and installs the half length splice bars. After the track has been aligned and well surfaced, the welding crew welds the base plate to the base of the rail as shown on Figure 9, first thoroughly tightening the bolts through the splice bar and spot welding the nut.

For 60-lb track a plate ½ by 7 by 20 in. is used; for 80-lb rail the plate is ½ by 7⅞ by 20 in. Two men, a welder and helper, can complete an average of 12 joints per shift. The approximate cost of the joint is as follows (these figures are for 60-lb track; with 80-lb rail the cost would be about 10 percent higher).

TABLE 6

COST OF COMBINATION JOINT

Bottom plate	$1.88
Set of half splice bars	1.40
Track bolts	.24
3½-lb welding rods	.40
Total material	$3.92
Labor	2.44
Total cost per joint	$5.36

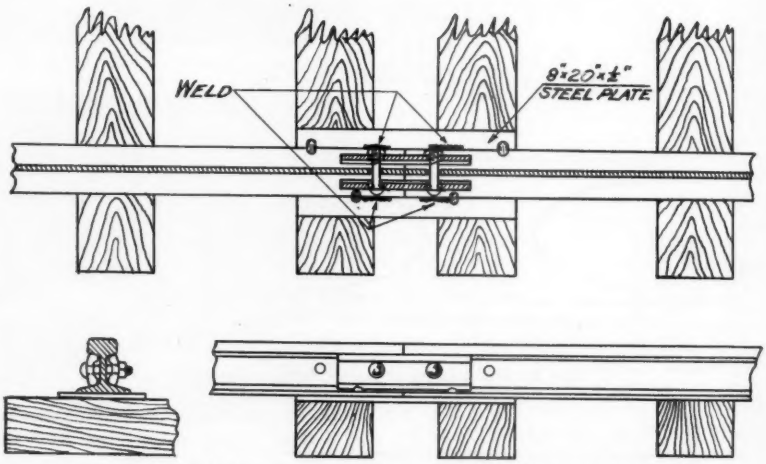
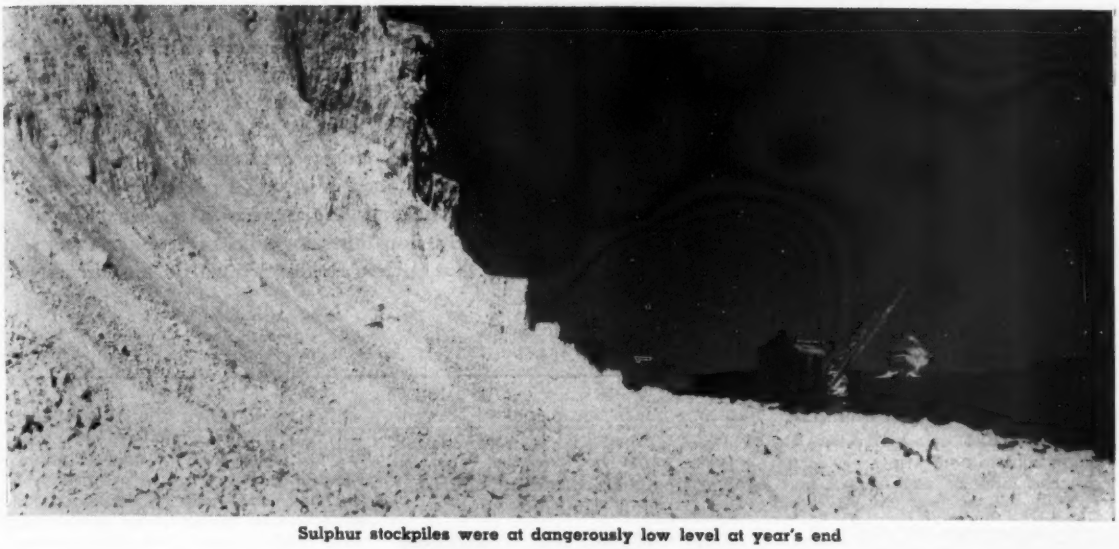


Fig. 9—Welded and bolted joint combines strength with electrical efficiency

Costs Are Not Comparable

In conclusion, the committee wishes to repeat a statement made earlier in this report—*viz:* the cost data given in the tables are not intended to indicate relative or actual differences between the four methods described. The figures do show the costs as reported by four coal companies but these operations are widely separated in three states. It is a well known fact that an operating or installation cost in any phase of coal mining is always dependent on local factors that vary from one field to another.



Sulphur stockpiles were at dangerously low level at year's end

Facts About the Sulphur Shortage

Sulphur Is in Short Supply for the First Time Since World War I. The Shortage Is Threatening to Affect Many Products

By J. C. CARRINGTON

Assistant to the President
Freeport Sulphur Co.

DESPITE the fact that U. S. production of brimstone (the principal form of sulphur in America) has increased 146 percent since the prewar years 1935-39, there is for the first time since World War I a shortage of sulphur. The impact of the shortage has brought the element, long taken for granted, into the national and international spotlight.

The shortage first began to be felt in the latter half of 1950. For 1950 as a whole, U. S. brimstone production was 5,350,000 long tons compared to total sales of 5,700,000 (4,259,000 domestic and 1,441,000 foreign including Canada). The difference of 350,000 tons—or 6½ percent—was made up by withdrawals from stocks of sulphur previously mined.

In 1951 the shortage is expected to be substantially greater than that of 1950. Not only is the demand higher but the supply will be less because further withdrawals from stocks should not be made. Stockpiles have fallen from a two-year reserve before World War II to a six months' supply in January 1951, a minimum requirement. Current needs therefore will have to be met from current production.

Various measures are being taken to distribute available sulphur on a fair and equitable basis. In accordance with our nation's international policy of strengthening our Allies abroad, the Government has directed American brimstone companies to allocate substantial tonnages of sulphur for shipment overseas. (Canada is considered to be part of the domestic market.) The quotas for the first half of 1951 amounted to 86 percent of the first six months' exports abroad in 1950. The final amount for the second half of 1951 has not been determined.

Plans are under consideration to allocate sulphur in the domestic market but up to now this task has been left to brimstone producers. Freeport Sulphur Co., for example, is allocating on the basis of 85 percent of sulphur purchased in the base period of October 1, 1949 to September 30, 1950. Special allowances are made for hardship cases due to plant expansion, strikes in the base period, etc., and these have the effect of increasing the over-all allocation above 85 percent of actual base period purchases. Under the Freeport plan all customers are treated on exactly the same basis.

Reasons for the Shortage

Principal reasons for the shortage are: (1) greater demands from abroad, (2) a disproportionate increase in domestic requirements, (3) the low price of brimstone which has discouraged development of higher-cost sources, and (4) the difficulty of finding new brimstone deposits.

Greater demand from abroad is due to the failure of foreign sources to recover from the war and to the fact that U. S. sulphur is cheaper and purer than foreign sulphur. These and other factors have led foreign sulphur acid makers in many instances to choose brimstone instead of pyrites as their source of sulphur when rebuilding war-damaged acid plants or

In this timely report J. C. Carrington, assistant to the president, Freeport Sulphur Co., points out the reasons for the serious shortage of this vital element. During the last decade domestic production has increased so rapidly that in 1950 it was 146 percent above the 1935-39 average. Output of other minerals, as measured by the Federal Reserve Board, was up 50 percent. Demand for sulphur at home and abroad has increased so much more than the increase in production that stockpile reserves are dangerously low—so low that current demand must be met entirely by current production.

Here are the facts.

constructing new plants. As a result, exports of U. S. brimstone to all countries including Canada were 155 percent higher in 1950 than were average annual exports in 1935-39.

Increases in demand for sulphur by U. S. industry and agriculture has been much greater than the general increase in industrial activity. Shipments of brimstone to U. S. consumers in 1950 were 180 percent above the average in 1935-39 while general industrial production was up 100 percent. These increased domestic shipments of sulphur were brought about primarily by the expanded requirements of large sulphur-consuming industries. For instance, the average per capita consumption of sulphur for 1935-39 was 35 lb; in 1950 it was 75 lb.

Practically all U. S. brimstone is now being sold to domestic users at a price at the mine of $21 to $22 per long ton. Sales of sulphur from foreign sources have been made recently at prices as high as $75 to $100 per ton. The $21 to $22 domestic price reflects an increase of about 25 percent over prewar (1935-39) prices as compared with an increase of 100 percent for wholesale commodity prices, as reported by the Bureau of Labor Statistics.

Huge current demand must be met from current production

The per ton price of brimstone is equivalent to about one cent a lb. Brimstone therefore is the cheapest of all the elements. Its price contrasts with 50½ cents a lb for nickel; 19 cents for aluminum; 24½ cents for copper; 17 cents for lead and 17½ cents for zinc.

Brimstone producers for many years have spent large sums of money searching for new deposits of sulphur, but successful explorations are rare. Salt domes are located exclusively along the Gulf Coast. Of over 200 such domes discovered, sulphur has been mined from only 12, and five of these have already been exhausted. The cost of prospecting and developing new mines has increased tremendously. Moreover, the risk involved is very great because the complete plant supplying hot water and compressed air must be built at the new location before it can be determined whether or not sulphur can be mined successfully in commercial quantities.

The Outlook for the Future

In considering the long range as well as the immediate outlook, it must be borne in mind first that sulphur is one of the most common and widely used of the elements. It occurs in the earth in various forms, and it is obtained commercially from many sources throughout the world.

In the United States the most important sources are the so-called salt dome deposits of native sulphur, or brimstone, located along the Gulf Coast. The next most important source is pyrites, an inclusive name for the metallic sulphides found in many states and in many foreign countries. Other sources are deposits of brimstone not of salt dome origin; hydrogen sulphide in sour natural gas and in oil refinery gas; sulphur dioxide at smelters; and sulphate minerals, such as gypsum.

Efforts to solve the shortage involve not only brimstone but other sulphur sources. On the brimstone front, several projects by producers are now under way. Texas Gulf Sulphur Co. is constructing a new sulphur mining plant at Spindletop dome in Texas, and Jefferson Lake Sulphur Co. at Starks dome in Louisiana. Freeport Sulphur Co. has begun work on a new plant at Bay Ste. Elaine dome in Louisiana. These three mines, however, are expected to be relatively small. Moreover, production at some of the older mines is expected to decline.

Unless new discoveries of large brimstone deposits are made, the solution to the sulphur shortage lies primarily in the development of production from other sources of sulphur. Sulphur industry members believe that the key to unlock this production is price. Most of this would be relatively high cost, but the reserves of sulphur that could be obtained from these sources are vast. Although the present economic controls in the national defense effort prevent an increase to restore the normal balance between demand and supply, sulphur industry members foresee an eventual increase in order to provide the impetus for greater sulphur production from the various sources.

U. S. Sulphur Sources

The production of sulphur in the United States has undergone a radical change in the last 50 years. Before the turn of the century this country was almost completely dependent on foreign sources for sulphur. Brimstone was imported from Sicily and Italy and pyrites from Spain. Even as late as the first World War, the United States imported a third of its sulphur requirements.

Brimstone was known to exist in this country prior to 1900, but its location under several hundred feet of unstable marshland prevented its being mined by existing methods until the invention of the Frasch process. This process is based on the fact that sulphur has a relatively low melting

ESTIMATED WORLD PRODUCTION OF SULPHUR

Country	1935-39 Avg. (Long tons)	Percent	1950 (Long tons)	Percent
United States	2,569,000[1]	31	5,966,000[1]	51
Japan	1,093,000	13	859,000	7
Italy	738,000	9	628,000	5
Spain	1,116,000	14	558,000	5
Norway	418,000	5	311,000	3
Portugal	195,000	2	295,000	3
Cyprus	173,000	2	289,000	3
Sub-total	6,302,000	76	8,906,000	77
Other 26 countries	1,898,000	24	2,794,000	23
Total	8,200,000	100	11,700,000	100

Between the 1935-39 period and 1950:
U. S. sulphur production (all sources) increased 134%
U. S. brimstone production increased 146%
Foreign sulphur production (all sources) increased 2%

[1] In 1935-39, 85% represented brimstone; in 1950, 90% represented brimstone.

point. Superheated water, pumped down wells, melts the sulphur, which is then forced to the surface by compressed air. The molten sulphur cools and solidifies in storage vats, which are later broken down for shipment.

In 1950, 90 percent of the total domestic supply of sulphur came from the salt dome brimstone deposits located along the Gulf Coast in Louisiana and Texas. These mines are operating at top capacity. There are

Sulphur, a key raw material for civilization

four principal companies mining brimstone in this area: (1) Texas Gulf Sulphur Co., with mines at Boling and Moss Bluff domes in Texas, (2) Freeport Sulphur Co., with mines at Hoskins Mound dome in Texas and Grande Ecaille dome in Louisiana, (3) Duval Sulphur & Potash Co., with a mine at Orchard dome in Texas, (4) Jefferson Lake Sulphur Co., with mines at Long Point and Clemens domes in Texas. Six companies produce brimstone from sour gas and sour oil, and about 50 other companies obtain sulphur in one or another form from pyrites deposits, smelter gases and other sources.

U. S. brimstone production in 1950 was 146 percent above the 1935-39 average. General industrial production, as measured by the Federal Reserve Board Index was 100 percent higher than the 1935-39 rate. Production of minerals, as measured by the Federal Reserve Board, was up 50 percent.

In contrast to the situation in the United States, the most important source of sulphur for the world as a whole has traditionally been pyrites. Before World War II, pyrites supplied over half of the world total from all sources.

In this last decade of accelerated growth by the brimstone industry, pyrites and other sulphur sources, however, have made little progress. This has been due mainly to two factors. In the first place, World War II and the subsequent economic instability disrupted foreign sulphur sources severely and they have not been able to recover their prewar position. Secondly, the low price and high quality (better than 99 percent pure) of U. S. brimstone placed it in a preferred position in the world market. The result has been that the U. S. brimstone industry is now supplying a far greater share of the world total. Last year it accounted for 46 percent of the world's sulphur supply as compared to 26-28 percent before the war.

Sulphur Used Universally

Sulphur in one way or another enters into the manufacture or processing of nearly every industrial product. First sulphur is converted into a secondary product, the most common being sulphuric acid. In the next step, sulphur in the form of acid or other forms is utilized by the end-use industry. These industries and the amount of sulphur they consumed in 1950 are shown in Table III.

In the final step, the products of many of these industries contribute in turn to countless other articles including almost everything we eat, wear or use. The amount of sulphur going into the different products varies widely from product to product. Representative sulphur requirements are approximately:

37½ lb for each ton of newsprint
1 lb for each lb of viscose rayon
174 lb for each ton of 3-8-3 fertilizer
2/5 lb. for refining each barrel of crude oil
18 lb for each ton of steel
65 lb for each ton of rubber
35 lb for the average automobile

TABLE I. U. S. PRODUCTION OF SULPHUR IN LONG TONS

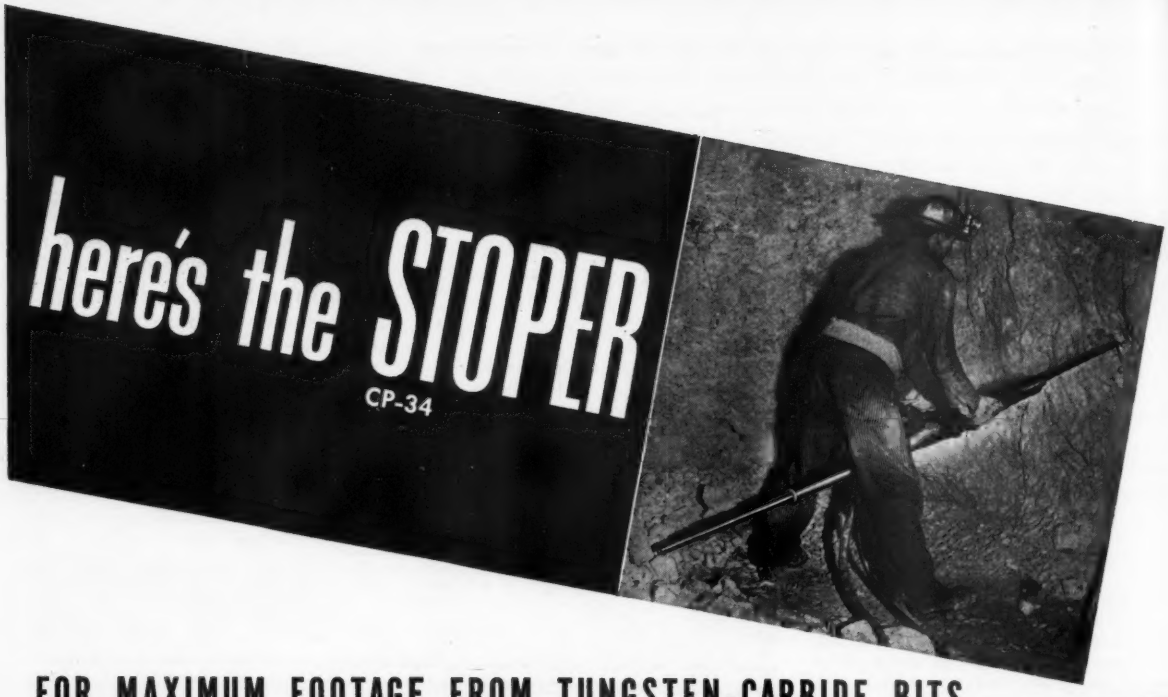
	1900	%	1935-39 Avg.	%	1950	%
Brimstone	3,000	4	2,175,000	84	5,350,000	90
Pyrites (contained sulphur)	82,000	96	222,000	9	391,000	6
Other sources	None	..	172,000	7	225,000	4
	85,000	100	2,569,000	100	5,966,000	100

TABLE II. EXPORTS AND IMPORTS OF SULPHUR IN LONG TONS

	1900	1935-39 Avg.	1950
Exports—			
Brimstone	None	566,000	1,441,000
All other sources	None	None	None
Imports—			
Brimstone	168,000	3,000	None
Pyrites (contained sulphur)	180,000	195,000	100,000

TABLE III

Industry	Long tons (2240 pounds)	Percent (approx.)
Fertilizers	1,665,000	34
Chemicals and miscellaneous	1,200,000	24
Petroleum	472,000	10
Pulp and paper	375,000	7
Rayon and cellulose film	365,000	7
Paints and pigments	307,000	6
Iron and steel	196,000	4
Insecticides and fungicides	140,000	3
Other metallurgical	110,000	2
Rubber	75,000	2
Industrial explosives	41,000	1
	4,946,000	100%



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With the *Defense Agencies*

MOBILIZATION Director Charles E. Wilson is ready to shake up the defense production organization, possibly eliminating the Defense Production Administration and lodging most of its powers in the National Production Authority.

Under the projected reorganization plan some of the DPA's present functions would be transferred to other Government agencies. Foremost among the shifts mentioned is the switching of DPA's authority over the granting of tax amortization for expanding defense facilities to the Reconstruction Finance Corporation.

The merger of DPA's policy controls over allocation of raw materials, defense production, and industrial expansion with NPA's direct operating control over industrial production would enable the latter agency to make and carry out decisions more quickly and more effectively. The combining of these activities would also relieve Wilson of finding a leading industrialist to head up DPA. That agency's acting director. E. T. Gibson, is anxious to return to industry, and it is likely that NPA Administrator Manly Fleischmann will head the combined agencies.

Wilson has strengthened his own administrative set-up by naming David D. Irwin, mining engineer and retired vice-president of the Pure Oil Co., as his assistant to handle problems involving metals and materials.

Wage Policy

A new national wage policy may be in the making. Stabilization Director Eric Johnston has indicated that the Wage Stabilization Board may adopt a plan which would allow wages to rise by the same percentage as living costs since January 1950, a rise amounting to 10.5 percent; permit annual increases of 2 percent for gains in productivity applicable to 1950 and succeeding years; and set standards for authorizing additional increases for "hardship or inequity" cases.

Price Regulations

In the field of price controls, the Office of Price Stabilization has issued orders rolling back the prices of zinc scrap, increasing residual fuel oil prices along the Atlantic Seaboard, setting dollars and cents ceilings on prices of ferrotungsten and other tungsten products, permitting multi-product machinery manufacturers to adjust the ceilings created for them by the January 25 general price freeze instead of referring back to their prices of the per-Korean base period established in CPR30, and setting ceiling prices on coal for Lake Dock operators and Tidewater Coal Dock dealers.

NPA Mining Machinery Division

Under terms of an agreement between the Secretaries of Commerce and Interior, the Commerce Department regained authority previously delegated to the Interior Department with respect to the manufacture and distribution of mining machinery and equipment, including private transportation facliities on mining properties, the predominant use of which is in the mining industry. Immediately after negotiation of the agreement, the National Production Authority created a Mining Machinery and Equipment Division within its Agricultural and Equipment Bureau and Named Harold A. Montag, former director of the Defense Minerals Administration Requirements Division, as its head. Assisting him in this new post is Leslie M. Case, also formerly with DMA, and Clyde Woosley, formerly with the Defense Solid Fuels Administration. The new division is responsible for the manufacture and distribution of mining machinery and equipment.

Under the new set-up the Defense Minerals Administration and the Defense Solid Fuels Administration remain claimants for maintenance, repair and operating supplies for the mines. Coal mines seeking assistance in obtaining MRO or capital equipment do so through the Defense Solid Fuels Administration, while the metal and nonmetallic mineral mines, smelters and refineries call upon DMA for assistance. These agencies likewise remain claimants for mining machinery for the mines. Manufacturers of mining machinery and equipment look to NPA's Mining Machinery and Equipment Division for their production materials.

NPA has also issued a number of orders affecting scarce metals and has paved the way for putting an open-end CMP program into effect on July 1. It has issued a list of Class "B" products designating those which will fall under the CMP program and those which will not be granted CMP allotment assistance. Included on the list for assistance are such products of interest to mining as specialized mining machinery and equipment, including crushing, pulverizing and screening machinery; excavating machinery; drills; pumps; electrical equipment; wire cloth and woven wire products; blasting accessories; industrial fasteners; industrial pumps and compressors; fans and blowers; jacks; electrical equipment; locomotives and parts; and transportation equipment.

NPA has also issued four of a series of regulations governing the operations of the Controlled Materials Plan. These outline steps to be taken by affected manufacturers before the plan becomes operative

(*Continued on page* 108)

Greatest Coal Show Ever

New Marks Set At Most Complete and Colorful Coal Convention and Exposition of All Time

HISTORY has never recorded a greater Coal Show than the one held by the American Mining Congress in Cleveland's Public Auditorium May 14-17. The 1949 Coal Show had set new records but the 1951 Coal Convention and Exposition broke them all. More people attended, and more manufacturers exhibited more machinery and supplies than ever before. It was truly a monument to the progress of a forward looking industry and a promise that coal is continuing its march toward even greater achievements in mining, preparation and utilization of the black "stone that burns" which is the backbone of our industrial civilization.

The Nation's defense effort makes ever increasing demands for coal. It is the basic raw material on which the chemical industry leans more heavily all the time, without which the steel industry could not function, and which provides the power to turn the wheels of factories and the light that turns night into day. These requirements have spurred the coal industry to greater efforts in modernization, and mining manufacturers have cooperated by turning out hosts of new and ingenious machines to multiply the efforts of each man working underground and on the surface to the fullest extent. Interest of mining men from every producing area in this country and many from across the sea is evidenced by the registration figures. Nearly 14,000 persons passed through the main lobby of Cleveland's Public Auditorium on their way to the exhibit halls and meeting rooms, all vitally concerned in ways and means of furthering the progress of mining. In addition to the thousands of coal mining men, there were many representatives from other branches of mining. Men from the iron ore, salt, gypsum, potash, copper, lead, zinc, limestone and other mines all came to see and learn; and went away enriched by what they observed.

Representatives of exhibitors in attendance included not only sales and technical personnel, there to explain the intricacies of the machinery on display, but also a large number of production men from exhibitors' plants —who visited the show to get a broader understanding of the coal mining industry and to derive new inspiration from a realization of the importance of their own work. Representatives of non-exhibiting manufacturers, interested in the application of many of the items on display to their own operations, were also on hand.

Committees Deserve Thanks

Under the direction of National Chairman Charles J. Potter, president of the Rochester and Pittsburgh Coal Co., the Program Committee composed of leading operators and manufacturers worked out an excellent series of papers on the economic, operating and public relations problems of the coal mining industry.

To the Manufacturers Division, headed by J. T. Ryan, Jr., executive vice-president, Mine Safety Appliances Co., go the thanks of all for assembling the most colorful and complete display of modern mining machinery, equipment and supplies that has ever been brought together.

M. D. Cooper and the members of his Floor Committee deserve special commendation for the efficient way in which they aided the chairmen of the sessions in keeping to the time schedule, and in promoting the discussions which added to the value of the technical papers presented. The Welcoming Committee, chairmanned by J. Ray Ulrich, Bethlehem Steel Co., deserves highest praise for its fine work in making convention-goers feel at home as soon as they entered the lobby of the Auditorium.

L. C. Campbell, Eastern Gas and Fuel Associates, chairman of the Coal Division, and the more than 200 operators and manufacturers who make up the division's committees gave unstintingly of their time and effort to provide both technical help and advisory assistance in the preparation of the program. The Coal Division, which works all the year round, provides the firm foundation on which rests the success of these annual meetings where the foremost leaders of the coal mining industry give the benefit of their experience and foresight to their colleagues the world over.

Officials Open Meeting

Following a morning left open for uninterrupted inspection of the exhibits the Convention was officially opened on Monday afternoon. After a few brief remarks Julian D. Con-

over, secretary of the American Mining Congress, introduced Charles J. Potter, Program Committee Chairman, who made the welcoming address. He expressed his thanks to the members of his committee and others who had helped in the preparation of the excellent program and colorful exposition, and voiced his appreciation of the efforts of the speakers. He welcomed all the visitors to the Convention and then introduced the Hon. Joseph C. O'Mahoney, U. S. Senator from Wyoming, who was the principal speaker.

The Senator in his capacity as chairman of the Senate Committee on Interior and Insular Affairs has long been vitally concerned in matters affecting the mining industries. Through his active participation in mineral affairs he has become thoroughly conversant with those phases of our national mineral economy that deal with coal mining. He speaks with authority when he urges the adoption of measures designed to bring about the intelligent use of our solid fuel resources.

Senator O'Mahoney emphasized that such utilization is necessary if America is to reassure the world of its non-imperialistic designs and continue to exercise the high-minded leadership so far manifested. He pointed out that the free enterprise system made this leading role possible and insisted that this system must be preserved.

United States Bureau of Mines research and development programs urged by Senator O'Mahoney have provided the ground work for the development of a new industry, the production of synthetic liquid fuels from coal. With the economic feasibility of the process demonstrated, the Senator said, the time has come for government to step aside and permit the intelligence and diligence of private industry to take the initiative in the traditions which have made our country strong.

"The first obligation of America in this world crisis is to keep itself

Senator O'Mahoney (left) headed the list of speakers on Monday afternoon. He shared the platform with (from left to right) M. D. Cooper, Floor Committee Chairman; L. C. Campbell, Chairman of the Coal Division; F. W. Earnest, Jr., President of the Anthracite Institute; George Van Hagen, Peabody Coal Co., and J. E. Elkin, Duquesne Light Co. (the other speakers); C. J. Potter, Program Committee Chairman; Julian D. Conover, Secretary, American Mining Congress and A. W. Dickinson

Members of the Inspection Committee, headed by J. T. Ryan, Jr., Chairman of the Manufacturers' Division, were pleased by what they saw during their Preview of the entire Show on Sunday

strong . . . to become an example to the people of the world. . . . There is no Iron Curtain that can exclude from any people anywhere the knowledge of the gains that can be achieved for every individual in a nation which enjoys freedom."

Following the Senator's brilliant address, reproduced on pages 34 and 35 of this issue, the session on public relations was started by the chairman, C. J. Potter. Papers were ably presented showing what is being done by the coal industry to bring to the country and to local employes a better knowledge and understanding of coal mining and its importance in our national economy and to make mining town life better and more pleasant.

Operating Sessions Interesting

On Tuesday morning, two sessions claimed the attention of those interested in coal preparation and in maintenance and power. At the first, under the chairmanship of C. A. Gibbons, vice-president, Susquehanna Collieries Division, M. A. Hanna Co., a panel discussed preparation problems and their solutions. Among the problems considered were the wet cleaning of fine coal, air cleaning, developments in coarse coal cleaning, and preparation of small sizes of anthracite.

Those who attended the session on maintenance and power, presided over by Karl L. Konnerth, Coal Division, U. S. Steel Co., heard the case for planned preventive maintenance, the necessity for a well organized maintenance department, and two papers on the lubrication of mining equipment. The topic of ac vs dc power systems was covered in the fifth paper presented at this session.

G. S. Jenkins, Consolidated Coal Co., was chairman of the Tuesday afternoon session on roof support. A full afternoon saw the presentation of five papers. Four of these dealt with various problems of roof-bolt installation, and the fifth with a machine for cutting and placing conventional timber supports.

Also on Tuesday afternoon a symposium, led by R. H. Swallow, Ayrshire Collieries Corp., discussed some of the problems of drilling and blasting overburden in strip mining of coal. Subjects covered ranged from the use of compressed air in overburden drilling through two-seam stripping to complaints about blasting vibrations.

At Wednesday morning's session James L. Hamilton, Island Creek Coal Co., was chairman. Featuring latest operating developments in mechanical mining, the four speakers described: an installation approaching continuous mining with a conventional mechanical loader; the use of trackless haulage equipment in 30-in. coal; main entry development in low coal; and the mechanical mining of pillar coal in the anthracite field.

A session devoted to coal mine safety under I. N. Bayless, Union Pacific Coal Co., was also held Wednesday morning. Here four papers were given, covering such widely varying subjects as protection against electrical hazards, pulmonary diseases, mine lighting and the practicability of diesel engines for coal mine use.

A symposium was held Wednesday afternoon to discuss machines and operating methods used in continuous mining of coal. M. H. Forester, Pittsburgh Consolidation Coal Co., presided at this session while various operators and manufacturers described

Model of a Link Belt Speeder dragline, operated by remote control, drew crowds of interested spectators

AMERICAN MINING CONGRESS

1951 Coal Show

Heavy stripping equipment was a major center of interest

In Upper Lakeside Hall—a wide array of new

All types of underground, stripping a

Coal mining "Broadway" in Lower Lakeside Hall—the gr

ray of new machines and equipment for every phase of mining

ripping and coal preparation equipment were featured

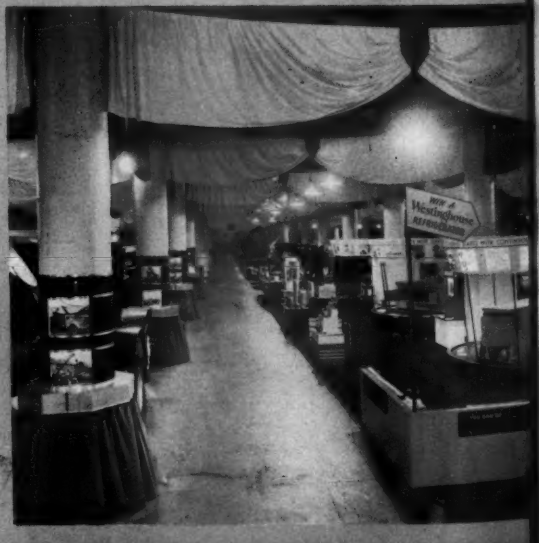
—the greatest showing of underground mining machinery ever assembled

An impressive panorama greeted visitors coming down the grand stairway to the main Exhibit Hall

North Exhibit Hall looking toward the Arcade

Upper Lakeside Hall (left and above) was "loaded" with heavy operating equipment of many types

Three huge mine locomotives drew crowds in



Colorful exhibits and overhead decorations

machines now on the market, gave mining plans used and results obtained.

A strip mining session also on Wednesday afternoon, under the chairmanship of T. G. Gerow, West Virginia Coal and Coke Corp., heard about the design and application of torque converters to off-highway trucks, a history of auger development and a discussion of the application of large augers to highwall mining, and a presentation by members of the American Mining Congress Land Use Committee outlining developments in stripland rehabilitation by coal and other mineral mining industries.

At the session on Thursday morning, L. C. Campbell, Eastern Gas and Fuel Associates, chairman AMC Coal Division, presided. In introducing Arnold Levy, counsel, Coal Defense Committee, the featured speaker, he pointed out that while coal seems abundant and, as a result, may not receive proper consideration, it could become short in supply if just one other source of energy, oil, gas, or whatever, were cut off. Following this observation he introduced Levy as one especially qualified through past training to deal with the Problems of Industrial Mobilization. The speaker, using this topic as a springboard, pointed out that it is important to take a long-range view on coal. Coal, he said, is going to be required to do a great many things and this is a good time to review the peacetime years to see whether they have prepared the industry to do what is now required.

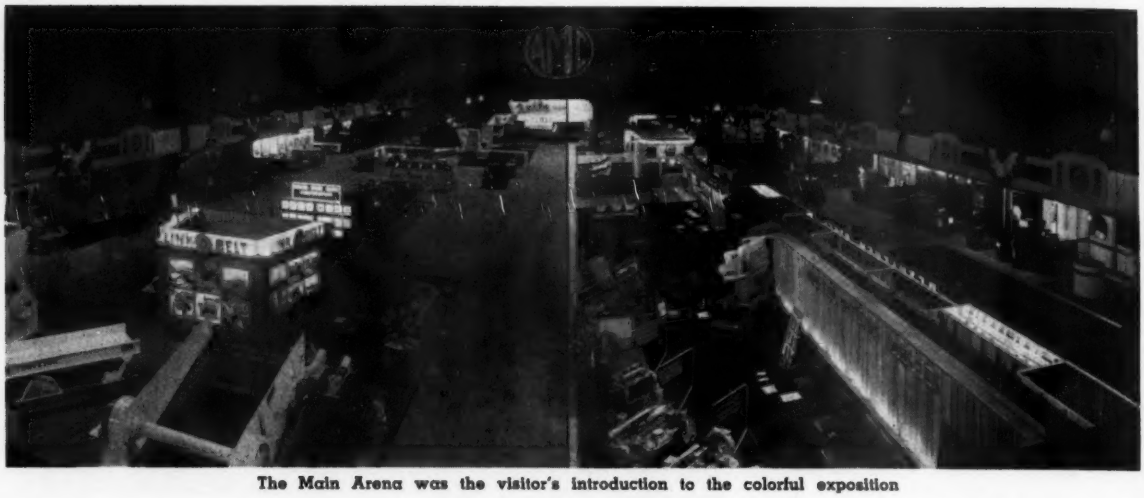
Mobilization itself, he declared, will follow, roughly, its previous pattern. The industry has able representation in Washington. The Mining Congress, the National Coal Association and the Coal Defense Committee are capable and ready to help resolve whatsover problems arise.

Levy emphasized the point that coal has an educational job to do. One phase of this is to dispel the impression of uncertain supply. This impression is the result of a past history of difficult labor relations. The statesmanship and intelligence on both sides of the bargaining table which marked the execution of the recent wage contract has already gone far toward changing this opinion in the minds of both the public and government officials.

Discussing the coal industry's problems from a broad viewpoint, the speaker touched on the need for an adequate percentage depletion allowance to maintain a sound incentive for continued development. He also discussed transportation, the freight rate structure, and imports of residual fuel oil.

"The coal industry," he said, "is today so far removed from the mining town, it is so wrapped up with what happens everywhere, and with trans-

Exhibit halls were crowded from morning until closing time with mining men from all over the world, intent on seeing all the newest and best equipment and supplies on display



The Main Arena was the visitor's introduction to the colorful exposition

portation that a national approach to coal industry problems is impossible without getting into every facet of our economy." Levy sees long-range planning as the hope for solution of coal's problems. The industry must seek out the young men who are capable of developing into broad-gauge economists, able to handle these situations as they arise.

This nation is in the midst of a fuel revolution. The next decade will tell whether the coal industry will develop an allied, integrated industry with synthetics, or lose them to the oil or chemical industries. Levy emphasized that coal cannot stand idly by and make no attempt to finance the research necessary to forestall this threat. Ahead is a long, hard road but, with enough interest in the industry to develop the kind of talent called for, coal can succeed.

The remainder of the morning's program was devoted to an over-all review of research and experiments to increase the efficiency of coal combustion methods and to widen the by-product field through the development of new synthetics.

In his closing remarks L. C. Campbell reminded those present that research is going on in biology, metallurgy, electronics and atomic research. Huge sums of money are being spent in these programs. Mining men, he said, are reaching out in far places for raw materials such as iron ore, and are finding them. Research is also going on in the use of lower grade ores of all kinds. There are but a few men, he said, who really appreciate what coal does for our nation industrially. We are all beginning to see that without coal we could not maintain America as a rampart against foreign politics.

Campbell pointed out that there is romance in coal. There is a job to be done and if those in the coal industry do not dramatize it and search to find the spark of romance in each lump of coal, and in so doing deliver a service and a product to the public, they will lose their rights as coal producers. He expressed confidence that the coal industry is going to succeed. The research front is there to conquer. Production men, he said, will render a service and furnish a product to the people at a price that will permit a profit, and in so doing will merit their birthright in that magic lump of coal.

Digests of all papers presented at the Convention sessions are given on pages 64 to 82 of this issue, and the full text of each will be published in *Coal Mine Modernization—1951.* As in the past, each session was preceded by a short motion picture on a topic of wide general interest. It would be impossible to say which session attracted the greatest attendance since the entire program was so well planned that every meeting had its quota of absorbed listeners who evidenced a lively interest in the papers and offered a full measure of discussion.

Manufacturers Meet

At the annual meeting of the Manufacturers Division, presided over by J. T. Ryan, Jr., Mine Safety Appliances Co., on Tuesday afternoon, Julian Conover, AMC secretary, presented his annual report to the members. He reviewed the activities of the Division during the year just past, the organization's work in Washington, the results of the Metal Mining Exposition last August in Salt Lake City, and plans for the future.

Following the secretary's report the manufacturers present participated in a discussion of materials allocations under the Controlled Materials Plan. H. A. Montag, chief of the Mining Machinery and Equipment Division of the National Production Authority, told of what has been done and what is proposed in respect to CMP. He gave information vital to manufacturers and suppliers if they are to continue their splendid cooperation in supplying the needs of the mining industry. Leslie M. Case, deputy director of the NPA Mining Machinery and Equipment Division, also made a few brief remarks.

Purchasing Agents-Defense Officials Discuss CMP-MRO

At the Purchasing Agents' round table on Wednesday morning, with C. J. Potter presiding, coal company purchasing agents from all parts of the country discussed procurement problems with officials of the Defense Solid Fuels Administration and the Mining Machinery and Equipment Division, NPA. Representing officialdom at this meeting were: Charles W. Connor, Defense Solid Fuels Administrator; C. C. Austin, Clyde Woosley, John Weysser and Don Sullivan, all of the Solid Fuels Administration, and H. A. Montag, chief, Mining Machinery and Equipment Division, NPA.

Exposition Highlights

Opening early on Monday morning and closing at 5 o'clock Thursday, the Exposition of mining machinery and supplies was the most complete and colorful in the history of Coal Shows. The displays of the 250 exhibitors covered five different levels of Cleveland's huge Public Auditorium. A total of 120,338 net sq ft of exhibit space contained every kind of coal mining machinery, safety device, auxiliary equipment and operating supply imaginable. Indeed, some of the units on display dwarfed the imagination with their size and complexity. In addition to the noise of the crowd explaining and discussing the exhibits, motors being turned on and off, continuous mining machines, loaders, conveyors, coal dryers, vibrating screens, etc., the flashing lights and colorful back-drops all contributed to the sus-

tained excitement of this, the greatest Coal Show ever. But behind the noise and lights and bustle, the sober determination to capitalize on the new equipment and on the latest operating ideas presented was easily discernible.

Of the underground mining machines, those designed to remove coal from the face continuously, drew special attention. With their wagging heads bearing sharp rotating bits and their shifting tails used to direct the coal into car or conveyor, they represent one of the latest developments contributing to mining efficiency. Loading machines, the forerunners of the continuous miners, attracted the attention of those whose mining plans do not provide for use of the continuous machines. To remove the coal fast enough from behind these units requires special equipment. New conveyors, cars and locomotives of many types were on display, all designed to speed coal haulage. All the component parts that make up the modern coal preparation plant were present in a myriad of designs based on a multitude of principles.

Manufacturers supplying machinery to the strip mining industry, where big equipment is the rule, outdid themselves. Trucks as big as railroad cars were parked in the exhibit halls. Huge tractors and bulldozers—the rubber tires of which dwarfed a man—were in evidence in a number of displays. A 30-cu yd drag-line bucket weighing more than 60,000 lb which had to be cut apart to enter the huge doors of the exhibit hall and then was welded together for exposition purposes gave some indication of the size of the equipment used in coal stripping. The exhibits even overflowed the huge building and there were on display outside, a drill for blast hole drilling in strip pits and a large diameter highwall auger-drill, designed to recover coal on the highwall side of strip pits where the overburden has become too thick for economical removal.

Four days were hardly enough to permit a careful examination of every exhibit. Each vied with the other in the skillful use of form, light, sound and color to attract the attention. From "Miss Link Belt" at the entrance to the Arena all the way to "Miss Texas" at the far end of lower level Lakeside Hall, each exhibitor had an important story to tell and it all added up to "coal mining progress in recent years has been tremendous—the promise of advancement in the future is stupendous."

Entertainment Is Tops

Coal Show week, always a time for reunion, was marked by many private get-togethers in the hotels all over Cleveland. Hospitality rooms maintained by many of the manufacturers were the scene of much friendly activity. The high point of the week was reached on Wednesday night when the Music Hall in the Public Auditorium was the scene of the Fred Waring Show. Playing to a completely sold-out house, Fred Waring and his Pennsylvanians, including accomplished singers and musicians, held their audience from 8:40 until 11 p. m. with only a short "seventh inning" stretch in lieu of intermission. It takes real showmanship to keep so diversified an audience entertained so continuously for such a long time. The Waring organization certainly has it!

Ladies who attended the 1951 Coal Show not only shared in the education to be derived from the exposition and the technical sessions, but also had a program of their own which included a well-attended tea on Monday afternoon and a trip to the General Electric Company's Lamp Department at Nela Park to see an exhibition of home lighting with the theme "better lights—better sight for the homes of America." On Wednesday morning over 200 attended the "brunch" at the Hotel Carter where they were entertained by Bob Ledyard, Cleveland's radio personality. Many prizes were awarded winners of the amusing contests held during the course of this entertainment.

Future Convention Plans

On May 5-7 the Netherland Plaza Hotel in Cincinnati, Ohio, will be the scene of the 1952 Coal Convention. As is the custom this meeting will review the operating and technical advances made during the year and outline plans for the future. There will be no exposition in 1952. The next Coal Show is tentatively scheduled for Cleveland again in 1953. All those planning to attend the 1952 Coal Convention in Cincinnati should make reservation direct with the hotels of their choice. The 1951 Coal Show is over but the strength and productivity that made possible this "greatest show on earth" will continue to grow, advancing in techniques and safety, to supply the vital coal on which we depend—as one exhibitor put it—"for the warmth of home, the usefulness of steel, the power of coal, the brightness of electricity, and the products of good living."

An unending stream of mining men kept the registration clerks in the main lobby of Cleveland's Public Auditorium busy from Monday to Thursday

Convention Papers

Abstracts of papers presented at Convention Sessions are given in the following pages. The full text of each, together with discussions and illustrations, will be published in "Coal Mine Modernization—1951."

NATIONAL DEFENSE—PUBLIC RELATIONS

The Coal Industry In the Modern Crisis

By HON. JOSEPH C. O'MAHONEY
U. S. Senator from Wyoming

SENATOR O'Mahoney's paper appears in full on pages 34-35.

Public Relations in the Anthracite Industry

By F. W. EARNEST, JR.
President
Anthracite Institute

IN discussing a coal industry Public Relations program it is important to look behind the scenes to see whether or not we, as an industry, are doing all of those things that should be done if our publicity is to bring about a more favorable attitude regarding our industry and its product. On the premise that "Public Relations begin at home," we maintain regular contact with newspapers and radio stations in our area and run proportionately as much advertising there, as in the outside market. This is to show the workers and the business people of the community what we are doing to hold and expand our markets. We hold meetings with company executives, colliery officials, officers of the U.M.W.A., and the business people of the region to keep them informed of developments in the industry.

Our next approach is our work with approximately 8000 retail coal dealers who market 80 percent of our production. We have a staff of 30 field and consulting engineers, all experienced in heating and combustion, who work with dealers and dealer groups in the sale of automatic burning equipment and the holding and expanding of tonnage. Schools are conducted for dealers and a monthly *Retail Dealer News* is published. We work with equipment manufacturers and finance space to exhibit modern anthracite burning equipment in many of the large home shows in the East and Middle West. We have an abundance of literature for schools and colleges. Films are supplied for use at service clubs. Each year there is an Anthracite Conference at Lehigh University sponsored jointly by the Institute and the University.

Our own large heating equipment laboratory at Wilkes-Barre, Pa., employs 50 engineers and technicians. Within the last few years, in cooperation with manufactureres, equipment has been developed that equals or exceeds the efficiency of oil or gas burners and that gives a convenience never thought possible with solid fuel, including bin feed and complete ash removal.

Unless such work is part of the over-all program, we do not feel that advertising by itself can produce satisfactory results. The Institute is spending this year over $1,000,000 in an industry advertising program. Approximately one-half of this is in television and the balance in newspapers and direct assistance to equipment manufacturers. In addition, individual producing companies are spending over $1,500,000 in similar media.

That, in its broad aspect, highlights the Anthracite Industry's current effort to gain greater public acceptance but we do not judge the success of our program primarily upon the immediate reaction of the ultimate Anthracite consumer. There are many other groups that affect Anthracite's success; for instance, the retail dealer, the equipment manufacturer and his dealers, the press, government, heating contractors, architects and others, to say nothing of the very important need to encourage the industry's own representatives. A program such as this commands attention from all groups and stimulates them to more favorable action in our behalf.

The favorable reactions already gained by the Anthracite industry's program are positive indications that solid fuel can hold and extend its acceptance by the consumer.

Employe Magazines

By GEORGE VAN HAGEN
Director of Personnel
Peabody Coal Co.

PUBLISHED in full in the May issue of MINING CONGRESS JOURNAL, page 54.

Mining Community Activities

By J. E. ELKIN
General Superintendent, Coal Department
Duquesne Light Co.

TO be a good citizen of the communities in which it operates, the Duquesne Light Co. encourages its officials

to actively enter into worthwhile community functions. Much of such work is done on company time and with company facilities. Likewise, much is done on the man's own time. The managements recognize that they have certain responsibilities to the communities in which they operate to improve the living conditions. The activities in which the company has engaged are in no way unusual or different from most communities, mining or otherwise, but it is believed that they have helped to gain the respect of the citizens where it operates.

Company employes started and have kept in existence the Boy Scouts in this area. Practically all committee members and officials of the scouting program have been members of Warwick Mines and much stenographic work for both Girl and Boy Scouts has been done in the mine office. An annual contribution to the Washington-Greene County Council of Boy Scouts of America, earmarked mainly for the upkeep of Camp Anawana, is made by the company. Two candy vending machines and two chewing gum machines were installed in the mine lamphouse, the profits being used for scout work.

At the town of Harwick, Pa., the company provides and maintains a baseball field, football field and an outdoor basketball court, and a playground with swings, sandboxes and wading pool.

In 1945, the wives of two company officials and the wife of a prominent man of Greensboro made plans for forming the Women's Club of Southwestern Greene County. It had around 80 members, and since most of the planning went on in the home of a company official, there was a very close tie between the organization and the company. These women were able to talk the company officials into taking part in a minstrel from which they made around $800 profit the first year. The money has gone to provide scholarships to girls graduating from high school with high honors, buy glasses for needy children, maintain a circulating library, place playground equipment in school yards, and provide many social and recreational activities for the community. There has always been the very closest relationship between the club and the company.

In both Harwick and Warwick we have tried to cooperate with boards of education. Monongahela Township High School was one of the first high schools in Pennsylvania to offer a course in coal mining. The school authorities asked for and received assistance in conducting these courses. Such things were provided as a shop building, some equipment, mine officials to take charge of several classes to give the students practical information of the latest mining methods, a trip into a working section of Warwick mine, and a trip through the repair shop where students were able to examine modern mining machinery.

It has always been company policy not to instigate or dominate community activities but to cooperate, when asked, in every way with all civic and social agencies. This policy is of prime importance for participation to be truly beneficial and to insure that there will be a good relationship between the company and the community. By aiding projects originated by community groups and by working in partnership with these groups, the company demonstrates that it recognizes that the citizens should control these activities.

Thorough pre-wetting of raw coal is needed for efficiency in any wet cleaning process

COAL PREPARATION

Problems in Wet-Cleaning Fine Sizes of Coal

By BYRON M. BIRD
Technical Consultant
The Jeffrey Manufacturing Co.

WHAT can a company do to improve its wet-cleaning of fine sizes of coal? If its coal is too poorly wetted, the best practical answer is to wet down the working place in the mine and then add more water to the coal at every opportunity. If the coal cannot be wet underground the use of hot-water sprays will help materially, as will the heating of circulating water.

Hourly capacity expected if a washer is to operate efficiently depends upon the difficulty of the separation and the number of particles per hr to be washed. A fundamental principle which has been overlooked too long is, "no one washes so many tons per hr" but rather, "so many particles per hr."

Each type of fine coal cleaning process has its own application and no one can be applied with equal success to all coals. It sometimes becomes necessary to use a combination of processes to gain the desired results.

Experience has shown that:

(1) The single most important item to watch in a wet-cleaning plant for fine coal is thorough wetting of the raw coal. No wet process will wash dry coal efficiently.

(2) Most fine coal cleaning problems are simple and can be handled with any of the conventional systems. Choice of process and flowsheet depends upon initial cost, operating cost, and ease of operation.

(3) Coals containing more than 10 percent near gravity material require special treatment. Research and experiment will indicate which system will work best.

Current Practices in Air Cleaning

By WM. C. McCULLOCH
Coal Preparation Manager
Roberts & Schaefer Co.

APPLICATION of the pneumatic process of coal cleaning has been extended to cover many conditions. Although primarily useful in cleaning fine coal for metallurgical uses, the process has found increasing use in the preparation of stoker coal and coal for power plant utilization. The severe winter just past has brought an increasing realiza-

tion on the part of operators and consumers for the necessity of dry coal to freeze-free shipments.

Air cleaning of coal has passed through several phases since its introduction about 30 years ago. At this time, only one type of equipment has any commercial importance. The Super-airflow coal cleaner, manufactured and installed by Roberts and Schaefer Co., is the only unit on which new sales were reported in the past several years. A McNally Brusset Vacuum Jig has recently been installed in West Virginia, and satisfactory progress is reported from this operation.

Operating principle of the airflow can be described in a few words. Coal and refuse particles entering at the upper, or feed, end are stratified by means of pulsating air. After the layer of refuse is formed it travels forward into pockets or wells from which it is withdrawn, while the upper layer of coal continues to travel over the slowly moving bed of refuse and is removed at the opposite end.

Exhaust air which picks up the dust over the airflow deck is pulled through either a cyclone dust collector or cloth filter and may be re-used or vented to the atmosphere. The exhaust fan is usually a planing mill type exhauster which must be capable of delivering the desired volume at about six in. water gage static pressure. The collected dust analysis does not usually deviate from the raw coal ash or sulphur content in the 48 mesh x 0 size and it may be recombined with the clean coal if the final quality is acceptable or it may be used as fuel or discarded as refuse. Auxiliary dedusters of several types may be included in the flow sheet if increased efficiency in dedusting is required. Usually about 65-70 percent of the 48 mesh x 0 is removed in the cleaning process.

In the earlier days of pneumatic cleaning it was conceded that moisture affected the cleaning only if it prevented screening to the sizes required. With increased efficiency in screening and the necessity generally of cleaning down to 48 mesh size, the rule of thumb does not apply. It is not always possible to specify a moisture percentage that is permissible, but two or three percent of surface moisture does not interfere with the separation of dust or impurities. In some cases as much as six percent is not objectionable. If there is enough moisture to interfere with the cleaning operation, heat drying may be used.

Recent Developments in Coarse Coal Cleaning

By DAVID R. MITCHELL
Head, Dept. of Mineral Engineering
Pennsylvania State College

DURING the last five years rapid developments in coarse coal cleaning machines have been brought about by:

(1) The rapid increase in mine mechanization
(2) The high cost of preparation plant labor
(3) The necessity of mining coals with higher impurity content
(4) Increased dollar value of coal
(5) Increased freight rates

In many areas, the low ash and low sulphur coals have been exhausted or are near exhaustion. Future mining must be in the high impurity areas remaining. In order to meet the specifications of special purpose industries, such as metallurgical, coals must be cleaned at specific gravities as low as 1.35.

Older types of coarse coal washers—sealed discharge launders, hydro-separators, menzies cones, and certain types of jigs—are well understood and are not discussed here. It should be mentioned that improvements continue to be made on these machines, particularly in their ability to handle increasing amounts of refuse.

Baum type jigs continue to be the most favored coal cleaning machine in the U.S.A. for bituminous coal. Four companies manufacture them and although varying markedly in mechanical details, they are remarkably similar in operating characteristics. As it is now manufactured the jig is excellently engineered and will continue to be the best machine for many coal washing conditions.

None of the processes using heavy liquids have had enduring economic success except the so-called calcium chloride washer; and it does not operate on a true float-and-sink principle since currents are used to assist the separation of the coal from the refuse. Much more success has been attained with pseudo-heavy liquids made up of suspended solids in water and development has been particularly rapid in this field in the U. S. A. during the past five years. Two distinct types of processes are used: (1) the Chance process using a medium consisting of sand suspended in water and (2) processes using a medium of finely divided magnetite in water.

The Chance process has been in use for approximately 30 years. It gives excellent results, approaching laboratory float-and-sink separations, in properly designed flows that take cognizance of specific gravity limitations and size range of feed. Many engineering improvements have been made on the Chance cone and accessory equipment. One of these the middlings draw, gives promise of simplifying the flow where a three-product separation is desired.

Processes using magnetite to form a heavy liquid medium have had a phenomenal growth during the past five years. Since it is new and still in a period of rapid change and development, details as to flow arrangement, results to be expected, and the role of accessory equipment, are not widely known by American coal preparation engineers. These processes have the ability to clean difficult coals efficiently at extremely low specific gravities, and the ability to make precise separations where a high percentage of near gravity material is present.

Cleaning Small Sizes of Anthracite

By JAMES HANNIGAN
Supt. of Preparation
Glen Alden Coal Co.

ANTHRACITE has always been marketed in closely graded sizes because it gives best performance when uniform in size. In a bed of nearly uniform pieces maximum void space is distributed throughout. This is the ideal condition for the combustion of anthracite. It was early recognized that the use of water in screening is a great aid in maintaining closer sizing, particularly with the use of the shaking screen clothed with round mesh. It is perhaps for this reason that the industry has always been inclined toward wet cleaning processes and has favored equipment to clean each size separately.

Concentrating tables were introduced into the anthracite field in 1922. These were very successful and filled a great need. They were packaged units that could be installed in existing preparation layouts; usually without extensive alterations. They clean each size separately, from Buckwheat No. 1-No. 5.

Sand flotation came in 1921. This process closely approaches a specific gravity method. A wide range of sizes from egg to buckwheat No. 3 may be cleaned in a single operating unit.

Twenty-five years ago a number of Rheolaveur Launder systems were installed in the field. However, there have been no new launder installations on anthracite in the last 15 years, so the performance of improved types on the more difficult anthracite is not known.

A washer of the classifier type, the Wilmot Hydrotator, has been used in all sections as a cleaner for the small sizes. It can clean efficiently each size separately, from Buckwheat No. 1-No. 4. The Hydrotator and the Hydro-

tator Classifier are very flexible, maintaining satisfactory coal and refuse ends under wide fluctuations of quantity and quality of feed. They have had wide acceptance in all sections of the anthracite field.

The Menzies Cone, developed about seventeen years ago, a washer of the classifier type, is capable of cleaning efficiently and economically all sizes, in separate units, from Broken to Buckwheat No. 5.

The Humphrey Spiral Concentrator has recently come into use. Two installations are in operation, doing a very satisfactory cleaning job on Buckwheat No. 5-80 mesh. This separator employs the principles of centrifugal and centripetal force to effect a separation between coal and its heavier gravity impurities.

Froth Flotation is still new in anthracite. The several installations that have been made within the last six years have demonstrated that this process is capable of cleaning the 28 by 200 mesh fines. Up to this time it is the only efficient and economical process available for the job.

Dense Media is the most recent cleaning process and has attracted wide interest. One plant is in operation cleaning 160 tph, of the sizes egg to buckwheat No. 2, in one unit with excellent results. Other plants are under construction or in prospect.

Related Problems of Mechanical Coal Cleaning

By F. P. CALHOUN
Asst. Production Manager
Rochester & Pittsburgh Coal Co.

THERE are numerous problems related to the operation of mechanical coal cleaning plants. Stream and air pollution, due to the discharge of waste water and gas from cleaning plants, affect not only the coal operator, but also the residents and other industries in the plant area.

Recovery of marketable coal from waste water can be done by settling tanks, screens, thickeners, filters, etc. This equipment should be a part of every cleaning plant. As conditions at plants are different, each plant should have the equipment to solve its particular problem.

Removal of superfines—those solids that make the water black or gray in some instances—can only be done by thickening followed by filtration or evaporation. The underflow, or thickened product, can be filtered in a vacuum filter and the solids either recovered for marketing or disposed of with the plant refuse. This underflow can also be pumped to an impounding reservoir where the solids remain and the water either evaporates or is filtered through the sides. In some instances, water from these reservoirs is used as make up water in the plant.

Air pollution is a problem encountered in air cleaning plants and fine coal drying plants. The seriousness of this problem is determined by the area in which the plant is located. Since coal dust in the atmosphere is a nuisance rather than a health hazard, it is not probable that statewide regulation of this type of air pollution will come in the near future. Recovery of dust from fine coal drying plants is a much greater problem. In the drying process, superfine material is freed of the moisture film that normally causes it to adhere to larger particles. This dust ranging in size from less than a micron to 100 microns, is suspended in the discharge gases from the dryer, much of it passing through the primary collecting equipment.

Tests conducted on wet gas scrubbers show that it is possible to remove 96-98 percent of the solids by this method. In some cases, the resulting gases would pass present city smoke ordinances. The recovery or disposal of the collected solids from a scrubber is another problem. Some success has been attained with filters using a bed of coal or other material as a filter for exhaust gases. By constantly changing the filtering bed, the dust is recovered with the coal or wasted if the filtering material is refuse. Electric precipitators are considered dangerous due to possible short circuits in the presence of dense coal dust accumulations. It seems that the best solution to this problem might be a selective drying method of fine coal that would not liberate any super-fine material.

Gases from gob fires are another source of air pollution in the vicinity of tipples and cleaning plants. These fires can be prevented by properly piling and compacting the material. Crushing is necessary if there are insufficient fines in the gob to produce a compact bed. The edges of the pile must be sealed with clay or similar material to control the admission of oxygen around the bottom and sides of the pile.

Drying Wet-Washed Fine Coal

By E. R. McMILLAN
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Mr. McMillan's paper will be published in the August issue of MINING CONGRESS JOURNAL.

MAINTENANCE AND POWER

Planning For Preventive Maintenance

By W. E. WOLFE
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National Electric Coil Co.

Mr. Wolfe's paper appeared in full in the April issue of MINING CONGRESS JOURNAL.

Maintenance Organization

By WILLIAM McGREGOR
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Bell and Zoller Coal and Mining Company
West Kentucky Division

IT has become obvious in the last few years that, in order to keep pace with the increasing trend toward mechanization, a higher standard of maintenance must be adopted. The early '30s marked a period of great mechanization underground, and recent additions and improvements to preparation plants have emphasized the necessity for the employment of trained personnel. Our Company follows the same general principles in the maintenance department employed by many leading companies. A description of the organization at the Oriole mine illustrates general practices.

A large outside shop is manned by nine men including machinist, welder, electrician, layout man, blacksmith and

general shop help. These men do all major repair and reconditioning of equipment. One electrician does all repairs on extra motors and controllers, including the rebuilding of any extra motors for loaders, shuttle cars, pumps, compressors or any other mine equipment. Rewinding jobs are sent to local or neighboring-city shops. Motors on face machines are replaced with rebuilt motors, where inspection has shown it necessary to avoid a possible burn out. Even for fairly minor repair jobs this may often be the most satisfactory. The machinist does most of the machine work on small loading machines, and has been very effective in rebuilding or repairing parts. Slow delivery on some critical replacements has enhanced the value of good machine tools and greatly increased the value of good machine operators.

Two outside electricians do all electrical maintenance on the preparation plant and on the generator equipment. One man keeps daily check on all generators. It is his early morning assignment to start the substation, change the record sheet on water gauge, check and grease fan bearings, and run the auxiliary fan motor once a week. The electrician for the coal washer does all emergency repair on electrical motor controls, makes any new installation such as the addition of controls for conveyors in truck bins.

Underground emergency repairs are made on the six loaders and their allied equipment by four men on each of the two operating shifts. These trouble shooters have a full schedule even if immediate breakdowns do not keep them busy, as they are promoting the practice of preventive maintenance in checking equipment at every opportunity. The evening crew follows the day shift and takes advantage of the hour between the shifts to make any repairs necessary before regular coal production begins. Six of the third shift maintenance crew start work two hours before the regular production shift is ended in order to relieve evening shift repairmen. A daily report is made by all inside mechancis to serve as a guide for the following shift and is an incentive to every mechanic to exert a greater effort.

Lubrication of Mining Equipment

By V. O. MURRAY
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Union Pacific Coal Co.

ONE of the most important functions in modern mechanized mines is the proper lubrication of all equipment so its normal life can be realized. Proper lubrication can eliminate many unnecessary breakdowns, which, in the long run, lowers the cost of coal.

Because of the wide variety of machines used in coal mines it is essential that lubrication be simplified. This is accomplished by first having a lubricating engineer from one of the oil companies come in and survey the equipment, and make a consolidated list of machines with the oil company's recommended schedule to reduce the number of greases and oils necessary for proper lubrication. These simplified charts, showing the different type oils and greases required, sometimes can be further simplified because of special conditions.

When the final charts are thoroughly discussed and studied by the master mechanic and the operating personnel, a complete file is kept by the master mechanic and the machine bosses in each mine. The machine bosses in turn instruct their maintenance and grease men in the use of the charts and the lubrication necessary. Men assigned to the job of lubrication are required to keep a record of each machine indicating how and when it was oiled and greased.

To assist in proper lubrication, each oil or grease is sent into the mine in colored, three, five and ten gal. containers with the type marked on the can. Sufficient cans are available so that when a supply is on hand for the day's use, another supply can be prepared and sent into the mines. Full cans are sent into the mine just before the end of the first shift each day and as they are distributed by the motormen and rope riders the empty cans are gathered and sent out.

(NOTE: The paper then gives the on-shift and off-shift lubrication schedules together with a complete list of the types of oils and greases used for the various parts of all the machines operated in a working section underground.)

Automatic Centralized Lubrication of Underground Mining Machinery

By L. W. DEUTSCH
Trabon Engineering Corp.
and
J. B. ANDERSON
The Texas Co.

ABOUT two years ago it was decided to install a fully automatic Trabon system on a shuttle car at Clinchfield Coal Co. for a 90-day trial. After this period it was proven conclusively, by thorough inspection, that the system would work and that it was a sound financial investment. Since that time many improvements have been made in the method of installation, as well as in the lubricating equipment. These installations have proven so successful that it is now standard procedure to install one on each loader and shuttle car at this company's properties.

Coal mining machines operate under the worst possible conditions; water and mud up to 18 in. deep, very rough floors, and cannot be serviced easily. A very slow, steady flow of grease through the bearings is the ideal seal against the water and mud. A Trabon lubricating system is connected to the wheel drive units, conveyor and traction motor reducers. The method of lubricating the wheel drives was to pack them completely with grease when they were installed and then connect the system to the worm case. In this manner, grease would be pumped in and fill the case completely and keep it filled at all times. Another connection was made at the bell housing to keep it filled completely along with the cage and the wheel bearings. Thus, mud and water could not work into this section of the unit. The spur gear speed reducers were also put in this system and a necessary vent installed in top of the case to relieve pressure and keep the grease from being pumped into the motor. A radical departure from conventional practice was made, when on one car the drive units were connected to the automatic system and lubricated by the same grease as used for other parts of the car. After extensive testing it was found that a lime soap grease prepared from a highly refined medium heavy viscosity straight mineral oil was most satisfactory. This grease was found equally dependable in all the other speed reducers on the car.

After seven months' operation two drive units were torn down and samples of the grease were analyzed. Conditions of the used grease indicated it to be remarkably akin to the new product. The only marked differences were that it had softened to some extent, and laboratory tests indicated that it had become slightly oxidized; on the whole, however, it was considered quite suitable for continued service.

Drive units were found to be in perfect condition, so they were re-assembled using the same parts. In other words, the worm wheels did not show any wear at all, neither did the worm drive. All bearings were in excellent condition. Furthermore, even though the drive units had been operated in water and mud, it was surprising that only a very small amount of grit was present. During this period of operation the total grease consumption was from one to 1½ lb for every 100 tons of coal handled by this shuttle car.

Comparison of A-C and D-C Systems for Underground Mining

By J. Z. LINSENMEYER and A. G. OWEN

Westinghouse Electric Corp.

IN general, mine power is purchased from a utility which feeds into a surface substation and from this station underground at high voltage for either the ac or dc system. Both the conversion unit in the dc system, and the transformer in the ac system have been designed for portability but quite a difference may be found in the ease with which these units may be moved. A mine type portable ignitron rectifier of 300 kw capacity consists of three units, each 62 in. wide by 42 in. high with one section 118 in. long, the second 82 in., and the third 105 in. Their total weight is approximately 16,000 lbs. A new portable 300 kw mine type transformer complete with four outgoing feeder breakers, is approximately 36 in. high by 44 in. wide by 104 in. long and weighs 4450 lbs.

This comparison of the ignitron rectifier unit with a portable transformer is not completely fair because the rectifier includes ac switch gear. A portable underground switchhouse for the portable transformer is 42 in. high, 30 in. wide and 110 in. long and weighs about 2000 lbs. However, the switchhouse need not be moved every time the transformer is moved. It would be moved only when going into a new area.

At a 300 kw, 250 volt dc rating the ignitron rectifier costs approximately $105 per kw. A transformer of similar rating costs approximately $20 per kw. The cost of the portable switchhouse varies depending on the interrupting rating required, and it cannot be priced in terms of dollars per kilowatt. An estimated figure on its use with a 300 kw transformer and with 100,000 kva interrupting capacity would be approximately $14 per kw. Considering the additional installation expense with the rectifier, the difference in investment is quite substantial.

Frequently as the work progresses the distance from the power source is increased, with resultant increase in voltage drop well over the 20 percent value originally estimated. With the dc it is possible to squeeze by with this poor regulation, although a severe loss in production may result. However, an ac system is much more critical with regard to voltage at the machine. The general opinion appears to be that the voltage drop must not exceed 10 percent.

Even though the ac system requires closer attention to voltage regulation this fact should not be used to condemn the system. It should be recognized that good voltage is essential to good production on both the ac and dc systems; and the ac system offers the advantage of an easily portable transformer to maintain the necessary good voltage at the face.

ROOF SUPPORT

Roof Bolting with Large Mobile Equipment

By JOHN K. BERRY

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Consolidation Coal Co. (Ky.)
Division of Pittsburgh Consolidation Coal Co.

IN deciding on equipment to bolt the roof of the No. 3 Elkhorn seam, the choice was not limited to existing models, as only stopers were available at the time bolting was started at the mine in Jenkins, Ky., and the seam did not lend itself too well to a stoper application. In the first place, coal height frequently fell below 50 in., requiring far too many steel changes. Then, while one entry might be 45 in. high, one on the opposite side of the section was frequently 70 in., so that special steels were required for each place. Finally, the shale roof could be penetrated faster by rotary than by percussion drilling.

Mining was done with mobile equipment, so a roof drill capable of over 15 holes per hour, including tramming, was necessary to hold its place in the face cycle. After over a year of experimentation to determine all the desired features, the company decided to build its own roof drills.

All drill operations are carried on by hydraulic motors, powered by an electrically driven hydraulic pump mounted on the machine chassis. The drill is a rotary type with hollow shafts for dust allaying water. Vertical feed is obtained by lifting the drill motor with the boom. The drill motor is only 15 in. high, from hose guard on the bottom to top of drive chuck.

With a boom type vertical feed the drill movement is in relation to the top of the seam, not the bottom, making any reasonable variation in seam height immaterial. Compensation for the arc of the boom is obtained by allowing the drill unit to roll freely on a pair of supporting tracks, giving self-alignment and eliminating any binding produced by the squatting of the machine under pressure. The boom swings horizontally for positioning of holes, permitting the drilling of up to four holes on four-ft centers from one location. An additional in-and-out motion of the boom is not only valuable for locating exactly a particular hole, but also can be used to aid the drill in compensating for the arc of the lift, where gravity or rock cuttings might tend to produce binding.

Experiments have proved that faster drilling time can be obtained "wet" rather than "dry." Wet drilling also produces a very great saving in drill bits. Formerly hard streaks in the roof would, at times, generate enough heat to melt the inserts out of the bit. Wet drilling is also positive, since it does not depend on the correct positioning of a collector nor on the cleaning of a filter for its effectiveness. As water is already piped to mine sections for other dust allaying operations, the extra cost is negligible.

To accommodate water the shaft of the drill is bored axially and a water swivel placed on the bottom, while the male chuck on the drill forms a seal against a gasket in the ball-shaped female shank of the drill steel. The latter is hollow and the water comes out through the cotter pin holes and around the shoulder of the bit.

Portable Equipment for Roof Bolting in Thin Seams

By C. E. HOUGH

Vice-President

Imperial Smokeless Coal Co.

OPERATIONS of the Imperial Smokeless Coal Co. are in the Sewell seam where the coal is 30-40 in. thick. Overlying strata consist of a draw-slate 4-10 in. thick and a gray-slate ranging from six ft to over 30 ft with many slips. In the middle of 1948 an experimental bolting program was started. By early 1949, the experiment was considered a success and the decision was made to roof-bolt in all working places. The results of the experiment showed that bolt holes could be successfully drilled in the roof with rotary drills using bits with carbide cutting edges. It was found that expansion type anchors and bolts 30 in. long were satisfactory when properly installed. The problem was thus reduced to the development of equipment suitable for drilling the roof.

During the trial period holes were made with a typical electric hand-held coal drill fed into the roof by a makeshift jack. This method proved unsatisfactory in principle and too many steel changes were required because the initial starting point of the drill was approximately 24 in. above the floor. Percussion type equipment was investigated and one short-leg stoper was installed on trial. In the meantime a manufacturer had designed a portable rotary drill for low coal and the percussion-type equipment was discarded because the rotary drill was considered more practical.

In developing the portable machine efforts were concentrated on the design of a three wheel truck of minimum height, light in weight so it could be pulled manually from place to place. The first machine was 6 ft 4 in. long, 43 in. wide and had a 12⅛-in. tramming height, which is also the height over the drilling socket. It was powered by a 5-hp motor, driving a 1½-gpm hydraulic pump. To permit straight line feeding for the auger a pantograph, raised by two single acting jacks, was mounted on the frame of the truck and the motor, pump and auger drive are mounted on the pantograph. The machine weighs 800 lb and tires 4.00 by 12 in. were installed to improve mobility. After a short time it became obvious that power tramming was essential. This was accomplished by installing a hydraulic motor on each wheel.

Two drills are now operating three shifts per day with negligible maintenance cost and few mechanical-electrical failures. A two-man crew for each shift drills the holes and installs the bolts. These are 30 in. long and ¾ in. diam with expansion type anchors and 5 by 5 by ⅜-in. plates. The bolts are placed on six-ft centers, tightened by hand with a ratchet wrench and tested by a torque wrench for a minimum of 175 lb. Each crew averages 10-12 bolts per hour when working in two or three adjacent places. Diamond point carbide faced bits are used.

Based on the actual operation in 34-38-in. seam heights the following improvements are to be incorporated in machines produced in the future.

(1) Hydraulic auger drill head drive, with nut tightener
(2) Maximum feed range increased from 18 to 26 in.
(3) Provisions for wet drilling by introducing water through the drill socket and hollow drill steel
(4) Decreased height of auger socket above bottom
(5) Hydraulic steering

Geologic Considerations in Roof Bolting

By AUREAL T. CROSS
Coal Geologist
and
PAUL H. PRICE
State Geologist
West Virginia Geological Survey

A NUMBER of theories have been postulated as to the nature of the support rendered to roof rocks by bolting. The plausibility of each of these theories is at least partially based on the nature and interrelationships of rocks involved. In order to interpret the conditions encountered in mine-roofs so that they may be effectively supported, we will review briefly the nature and origin of the rocks themselves.

Some sandstones are well-cemented and tend to be without well-defined bedding planes. The presence of such massive sandstones usually means excellent roof conditions. Occasionally the lower few feet may be quite irregularly bedded with thin laminations. When mica flakes and carbon shreds are concentrated on the laminae planes of weakness are formed. Bolts must pass through such planes of potential separation for security; and since these planes are most often at an angle, vertical pinning is recommended.

Massive-bedded limestones are usually not encountered directly above the coal seams in the Appalachian area. However, in the mid-continent area, marine limestones are found in this position at several horizons and where they occur they afford a good anchor-rock for bolts. There are a number of thin to thick-bedded, often very irregular limestones in the upper part of the Pennsylvania strata in the Appalachians. Usually several feet of soft, limy shale or roof shales lie between the coal seam and the limestones, making bolting impractical except in extremely important places, because of the great amount of material to be supported.

In some of the evenly laminated shales, which are often as much as 30 to 50 ft thick, there is practically no change from bottom to top. Bolts inserted in such uniform and homogeneous, thin-laminated shales actually may form a multiple-ply beam by bolting the laminae together much as the resin bond in plywood holds those layers together. Or it may anchor into a higher part of the same shale which has not been oxidized, broken, split apart or otherwise weakened during mining operations.

A number of inclusions or irregular substances occur in the roof shales. One of the most common and the most dangerous to miners is the erect casts of former trees or "kettle bottoms." In several mines these casts have been bolted up by angled bolts or supported by headers connecting the bottoms of the bolts.

Occasional ore bands, zones of ironstone, lime concretions, or nodules are encountered in the roof shales. Disproportionate swelling of some of these nodules, especially those high in iron pyrite or marcasite, cause the shales to weaken rapidly. Bolting is only temporarily effective if they are abundant for they have a tendency to fall out around the bolts as does any shale which is rich in pyrites.

Perhaps as common as the thick even-bedded shale is the thinner, sandy shale, or interbedded shale and siltstone roof of many coal seams. Such a roof is usually fairly safe when bolted. One or more of these layers of competent shale or sandy shale may occur in the interval between the coal and the top of the bolts, and in some instances the support afforded is a combination of anchoring to a stronger rock and forming a beam. There is some advantage to angling the bolts over the ribs to afford additional strength as the shales themselves often vary enough in thickness so as to be not everywhere sufficiently strong for the total weight suspended.

Roof Drilling with Dust-Control Equipment

By JAMES WESTFIELD
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DRILLING for roof bolting has created a new dust problem for the coal mining industry. Drilling is inherently dusty, and the control of dust produced by drilling vertical, or nearly vertical, holes is much more difficult than control of that produced by drilling flat or down holes. Also, the dust produced by roof drilling differs in composition from that produced by drilling the face, in that it may contain significantly greater amounts of free silica.

The hazard of exposure to silica-bearing dust is commonly gaged by the number of dust particles found in a unit volume of air and the free-silica content of the dust. To maintain standards recommended by the U.S.B.M. a dust concentration higher than 18.9 million particles per cu ft of air would not be allowable when the average

shale roof is drilled, and a dust concentration higher than 9.1 million would not be allowable when the average sandstone roof is drilled. In some instances a dust concentration no higher than 5.7 million would be required.

Dust produced by roof drilling must be arrested or collected at its source if it is to be controlled adequately. This can be done with water or a dust collector. Water can be used effectively with pneumatic percussion or hydraulic rotary drills while dust collectors can be adapted to any type of drilling equipment.

Wet drilling must be supplemented by ventilation to obtain the desired control, as the water does not arrest the dust completely. Other conditions being favorable, normal ventilating currents should prove adequate but will have to be directed to the drilling operation. The most frequent objection to wet pneumatic percussion drilling is that it is a disagreeable task. However, wet drilling has been accepted as standard practice in metal mines; this practice is applicable to roof drilling. It complies with the Federal Mine Safety Code requirements, and suitable drilling equipment is immediately available to the coal mine operators.

Most dry dust collectors operate on the principle of application of exhaust ventilation near the source of the dust. Some of these have demonstrated that successful results could be obtained, even under the most difficult conditions. The Bureau of Mines has inaugurated a program at Bruceton, Pa., for testing dust-collecting devices developed commercially for application to roof drilling in coal mines. Under this program, performance tests have been conducted for six different types of dust-collecting systems and the results of some tests have shown that it is possible to reduce roof-drilling dust concentrations to five million particles per cu ft of air with dry dust collectors.

These results are not to be construed as "approval." The Bureau of Mines anticipates announcement of a schedule establishing permissibility tests, after which it will be possible to grant formal approval to equipment passing the prescribed tests. The experience gained at the Experimental mine and in the field will be applicable in the preparation of this schedule.

Combined Coal Drill & Timbering Machine

By C. M. HAYS
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Pittsburgh Coal Co.

IN the mechanical loading cycle at most coal mines, face preparation has been the "bottleneck," particularly the drilling and the timbering. The development of equipment for this work has not kept pace with advances in cutting, loading and gathering equipment. At the Renton No. 3 Mine of the Pittsburgh Coal Co., it was decided to develop a combined drill and timbering machine. Such a machine was designed, built and put into operation. Various changes have been made to improve its operation and the drilling and timbering problem has been solved.

When mechanical loading was introduced in 1939, hand held electric drills were used for a short period after which post mounted drills were installed. Extra-long drill mounting-posts were required to accommodate seam thickness of approximately 8 ft making three setups necessary for drilling the top and bottom holes. When drilling top holes, the operator must quite often use a platform to allow him to slide the drill up and down the post and to exchange auger sections. When needed, the driller has the assistance of the timberman who must be taken from his own duties. Hand timbering requires carrying material for some distance, hand sawing of posts and heavy lifting. The average number of places drilled and timbered by the above method is three-four per shift, depending upon roof conditions.

In some mines, potential production is limited by one or more factors such as heavy timbering requirements, differential mining methods due to bone or slate bands, excessive water, etc. In such cases, the need for expensive completely mechanized drilling equipment may not be readily apparent, since its capacity may not be fully utilized. This might also be said of the power timbering machine. However, when the combined work cycle of drilling and timbering can be performed by one machine and one crew, the advantages of such a machine should be apparent. Management's problems increase directly as machinery is added to the cycle.

For these reasons a combined drill and timbering machine was developed by the Joy Mfg. Co. and put in Renton Mine in May 1939. It has been in operation, except for minor breakdowns, ever since. After the drill is positioned the auger, a single non-sectional piece mounted inside the feed, is advanced hydraulically. A saddle provided on the drill is used to set timbers. The saddle is full-swiveling and can be moved back and forth along the drill, since it is connected to the drill feed. The entire mechanism can be telescoped so that all holes can be drilled from the same set-up without moving the truck. The only limiting factors are the boom-swing, about 17 ft, and boom-lift, about 9½ ft. Within that distance the truck need not be moved after the correct position is established.

Results with this machine have been very encouraging. Average drilling time is approximately one minute per 10-ft hole, while the auger retracts in six to ten seconds. The average drilling and timbering time per place is 45 minutes as compared to two hours with the post-mounted drill and hand timbering. An average of at least six places are drilled and timbered per shift compared to three or four with the post-mounted drill and hand timbering.

STRIP MINING

Compressed Air In Vertical Drilling

By W. J. CRAWFORD
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Enos Coal Mining Co.

MR. CRAWFORD's paper appeared in full in the April issue of MINING CONGRESS JOURNAL.

Selective Elevation Horizontal Drilling

By DONALD D. SAXTON
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Hanna Coal Co.

IN mining the Pittsburgh No. 8 coal, the most difficult formation to fracture is the Fishpot. This is a massive rock between 15 and 20 ft thick located approximately 25 ft above the coal. However, it is separated into three layers, which makes blasting somewhat easier. The lower portion of the Fishpot formation, found just above the

rider seam (Pomeroy or Redstone coal), is of a siliceous shaly nature relatively free from nodular pieces of limestone, sulphur balls, niggerheads, and concretions, making it amenable to auger drilling.

An effort to increase drilling speed was made by the introduction of the 42-T Bucyrus-Erie drill, a machine capable of drilling 10-in. holes. This allowed a greater concentration of explosives in the stratum desired and a wider spacing of holes. Soon higher production demanded increased drilling speed, and a hydraulic-controlled sidewall drill was located on the coal, drilling in the overburden four or five ft above the coal. These two types of drilling machines preparing overburden for the same stripping shovel gave a valuable insight to the ultimate answer.

A study of the overburden resulted in the inauguration of a triangular blasting pattern. The overburden material near the rider seam permitted the drilling of two horizontal holes in the same time that one could be drilled in the bluestone. The bottom holes were drilled perpendicular to the face of the overburden, while the top holes were drilled at a 45-deg angle from the face radially from the same location. In developing a mounting to permit the triangular blasting pattern, the mast and tools were removed from the 29-T and a steel frame was constructed over the remainder of the machine. The frame supported three sidewall drills placed in an isosceles triangle.

Changes in overburden stratigraphy in some areas often increase the amount of time required to drill the top holes, and necessitated a change in the triangular blasting pattern with two parallel rows of staggered holes in the face of the overburden. The drill mounting was altered to accommodate this pattern by removing one of the lower platforms, and locating the top one to permit the spacing of holes as desired. This allowed both drills to operate simultaneously.

Slight variations in the elevations of the strata in the overburden led to the final stage of the development of the horizontal drill platform for selective drilling. The machine now in use employs two moveable platforms that carry sidewall drills capable of drilling six nine-in. holes at any elevation in the overburden within a range of 25 ft. The unit is 35 ft in over-all height, 45 ft in length, and weighs approximately 60,000 lbs. The compactness of this machine permits it to be moved around the stripping shovel, thus overburden can be prepared in front of or behind the shovel.

Recent Drilling Developments

By GENE H. UTTERBACK
Chief Engineer
United Electric Coal Cos.

THIS paper is limited to the discussion of three different drilling machines. First described is a tractor-mounted compressed air drill built by Hart & Hart of Providence, Ky. This machine uses a Jaeger air compressor which delivers sufficient air to supply two conventional four-in. drifter drills, and is mounted on a Caterpillar tractor. Drill steels may be 14-16 ft, or more, in length, making steel changes less frequent in deep drilling and in many instances eliminating any change.

This mobile compressor and drilling unit will travel over rough terrain, mud, ditches, boulders, and steep slopes. Moving from one set of drill holes to the next is done in 12-15 sec. Three men are required to run the machine, two drillers and one tractor operator. When drilling two in. holes 8-12 ft deep in hard limestone, an average production of 250 ft per hour can be expected.

A rotary drill, especially designed for hard sandstone, solved a difficult drilling problem at Homestead mine of Sinclair Coal Co. This machine was described by Howard Frisbie in a paper presented at the 1949 Coal Mining Convention. (Reprinted in *Coal Mine Modernization* Year Book, 1949 Ed.)

The third drilling machine discussed is one built for the United Electric Coal Cos. for use at their Fidelity mine near Du Quoin, Ill. where the drilling and blasting is complicated not only by the top stratum of limestone, but also by intervening layers of mud and sand. For the last several years the 9-in. blast holes have been drilled by churn drills. While churn drilling is dependable it is also slow, hence expensive. For a mine geared to produce 10-12,000 tons per day, overburden drilling becomes a task of considerable magnitude.

Consequently, the company decided to try a new approach to the drilling problem and Reich Brothers Mfg. Co. at Terre Haute was employed to design and build a drill that would combine the speed of auger drilling and the versatility of churn drilling. To obtain minimum time per hole it was decided to utilize a 48-ft stroke, with an extra 20-ft section of drill stem to be added for deeper holes.

With a 48-ft continuous stroke available, the fast removal of top soil and clay was deemed necessary to utilize fully the advantage of the long stroke; therefore, an auger spiral was welded on the outside of a 5½-in. flush O.D. drill stem. The spiral proved its worth, when on the second day of testing, a 9-in. hole was drilled 44 ft deep through clay and soft shale in one min and 37 sec. This high speed augering was possible only with the addition of water through the drill stem at the rate of 120 gallons per minute under 300-lb pressure. When augering a similar hole dry, eight minutes were required.

Average drilling time for a nine-in. hole 45 ft deep, through 12 ft of surface, eight ft of top rock, 10 ft soft shale, five ft blue limestone, and 10 ft slate and hard shale, was 48 minutes. Further experiments are being carried on which will permit drilling a 70-ft hole without adding drill stems.

Reduction in Strip Mine Blasting Vibration

By ROBERT L. AKRE
Superintendent of Drilling and Blasting
Maumee Collieries Corp.

IT has been the past practice of the Maumee Collieries Corp. to shoot overburden with first period delay caps, alternated with instantaneous caps, as a detonating medium. Within the last two years, however, complaints of vibrations from nearby householders have forced experiments with different type detonators and detonating devices. At first an effort was made to cut down the number of holes detonated at each shot, but the number of shots had to be increased and complaints rose proportionately in volume and intensity.

Tests using 25 millisecond delay caps as detonators in alternate holes showed that vibrations were reduced some of the time but not always. Blasts of up to 35-40 holes detonated by the use of a patented blasting timer gave excellent fragmentation and reduced vibration. Its use, however, involved complicated wiring and increased labor.

Early in March a manufacturer of explosives introduced a British patented device called an "MS Connector." The manufacturer and other observers reported that in one pit where the device was used vibrations were reduced approximately 75 percent. When a supply of the "MS Connectors" became available, two experimental blasts were made. In both cases it was noted that vibrations were negligible, a fact confirmed by the nearby residents who had been most violent in their claims of blasting damage. Although fragmentation results can not be deter-

mined until the shots are dug out, the decision was made to use the new system of detonation.

The new practice, which permits a greater number of holes per blast, will eliminate night shooting, when vibrations are always more noticeable and irritating. A further advantage results from the use of daylight hours for more efficient and accurate preparation of blast holes.

Drilling and Blasting in Two Seam Strip Mining

By RUSSELL BADGETT, JR.
Secretary-Treasurer
Badgett Mine Stripping Corp.

IN 1944 a contract was negotiated between the Badgett Mine Stripping Corp. and West Kentucky Coal Co. to mine the Nos. 11 and 12 coal at the Hecla mine. For the first two years the overburden was relatively shallow. On the outcrop, the No. 12 coal was about 12-16 ft deep on the highwall side; above the seam there were six-eight ft of blue shale which had to be blasted loose. The remaining cover was surface earth and handled easily. Below No. 12 there was about one ft of fireclay, then a seam of limestone rock four-six ft thick; then there was another six-eight in. of fireclay under which lay the No. 11 coal. The No. 12 coal averaged four ft in thickness, the No. 11 coal was six ft thick.

Early outcrop stripping was done with three 5-W Monighan draglines in tandem. The lead worked from a level surface and made a roadway as he moved the first lift on the highwall side. This cut was made to the top of the blue shale. The second dragline cut from the level of the bench left down to the surface of the No. 12 coal. If the coal was bad it was cast over the spoil, uncovering the limestone which separates the two coal seams. After the limestone was drilled and shot the second dragline came back and cast the limestone on the spoil bank.

Present stripping system is in heavy cover, up to 70 ft on the highwall side. A 120-B Bucyrus shovel takes the first lift which is largely sandstone, either massive or laminated. It digs to a depth of 28 ft or down to the blue shale, depending on the geology of the particular section. The laminated sandstone is prepared for shooting by drilling six-in. holes 96-100 ft in the sidewall. In the massive sandstone an Ingersoll-Rand quarrymaster puts down 12-14 six-in. holes 30 ft deep in eight hours. The method of loading depends on the character and depth of the rock. Drilling for secondary shooting with tractor mounted air drills is frequently necessary with the deeper massive sandstone.

After this first lift is removed, a vertical auger is moved in to drill the blue shale. The auger is a home-made machine with a molefoot bit and drills about 10 ft of six-in. hole per minute. These holes are spaced on 20-25-ft intervals depending on the thickness of shale.

This blue shale is then moved by the 12 cu yd Bucyrus dragline which sits on a berm on the spoil side and casts the overburden well back from the pit to prevent slides. In the deeper overburden there is a band of very hard limerock above the No. 12 coal. This band is six in.-two ft thick averaging one ft. Because the vertical auger will not drill this band, air drills are used. The dragline is usually close to this shot material and moves back on the berm to reach it if necessary. Where it is thin and there is no appreciable yardage, a bulldozer pushes it up to the dragline.

In present operation in heavy overburden the coal is loaded with a five-cu yd Lima shovel. For the most part the coal is not mixed but at times of peak demand a blend of Nos. 12 and 11 coal is saleable.

Torque Converters in Strip Haulage Units

By D. M. SCHAEFER
Allied Division
General Motors Corp.

HYDRAULIC torque converters have finally become established in the heavy machinery field for service in dirt moving, ore mining, and coal hauling equipment. At the present time practically all large coal hauling operators in the United States are using one or more vehicles equipped with torque converters at their mines. This new method of transmitting engine power to the rear wheels has become the accepted means of handling the new higher horsepower rated engines, especially diesels.

Torque converters provide an automatically, infinitely variable torque-ratio transmission which, within the designed range of operation, will immediately correlate load speed and resistance. In short, it supplies a fulcrum for changing, automatically, the mechanical advantage of the engine as the load varies. This fulcrum relocation is accomplished through the use of oil as a working fluid, thus permitting shock-free operation and full-power engine running during the change. In addition it responds at once to load variation with no effort or attention from the operator.

In most converter designs the unit consists of a pump, turbine, and one or more stators. These are either mounted on free wheel clutches or attached solidly to the converter housing. When the stators are not free to rotate the unit is called a hydraulic torque converter. When they are mounted on over-running clutches, the unit is referred to as a hydraulic torque converter and hydraulic-coupling combination. The latter is the type most common in the coal hauling field.

Regardless of the type of converter used, the functional characteristics of absorbing and delivering power are the same. Generally the pump of the converter is driven by the engine. Oil is moved with high centrifugal and angular velocity through the stalled turbine. This oil flowing from the pump into the turbine has its direction changed by the turbine blades and exerts a direct force upon the turbine. The reverse curvature of the turbine blades is responsible for the change in direction of the oil stream.

The following list of advantages contribute directly to

Anthracite stripping has its special problems in overburden removal

the versatility of coal haulers equipped with torque converters:

(1) Heavy loads are started and accelerated easily and smoothly
(2) No shock or torsional stresses are set up in the power train when operating or shifting gears
(3) Low speed lugging of engines is eliminated. This assures maximum hours of operation before overhaul
(4) Engines do not stall when the going gets rough
(5) High power factor range with great load variation results in more work done at a lower unit cost
(6) Less operator fatigue
(7) Greater availability because of less down time due to mechanical failures
(8) Full-power shifts are at finger tip control with "torqmatic" transmissions
(9) Provides a practically constant input horsepower over variable output speed range.

Large Augers for Highwall Mining

By D. M. BONDURANT
Assistant Professor Mining Engineering
West Virginia University
and
C. E. COMPTON
President
Grafton Coal Co.

A CONTINUOUS machine for above-ground coal mining, the coal auger, to recover coal after stripping has reached its economic limit, has become accepted throughout the industry. Several machinery companies have built augers that are doing a creditable job; notable among the many in operation are four that were designed and constructed by the Grafton Coal Co. of Clarksburg, W. Va.

Three main parts make up the machine: the frame, augering unit, and elevating conveyor. The frame is a rigidly welded structure of 18-in. steel tubing. Its function is to give weight against thrust, to provide means for correctly aligning the augering unit, and to provide a proper runway on which the unit can travel while the auger is being moved forward into the coal.

The drilling head is a hollow cylinder formed of ⅜-in. steel plate 52 in. in diam, six ft long. Carbide-tipped bits are spaced on the front end of this cylinder and set to cut a 2½-in. kerf around a core of coal. Following the leading edge of the cylinder, a center cutter drills a small hole, and a tapered cone breaks the core by wedging action between the cone and the outside kerf. Broken coal is conveyed from the drilling head by the auger. The auger sections are right hand screw conveyors rotating clockwise; these discharge the coal from the left side of the hole onto an elevating chain conveyor.

Drilling operations are as follows: At the start, the drilling head and the first auger section are set in position. The auger is carried froward into the coal until the bearing shoes are seated in the hole. This is done in the lowest speed range of 0-8 fpm at an average speed of four fpm. Each 35-ft extension is drilled to its full length in approximately nine min. The auger is then uncoupled and the traversing carriage is trammed to the rear of the runway. Less than a minute is needed to traverse to the rear and insert a new auger section. Additional auger sections are lifted from the racks by overhead hydraulically-operated hoists and dropped into position as needed. Repeated drilling and attaching of the auger sections is continued until the hole is completed.

A crew of four men operate the machine; one operates the traversing carriage, one operates the leveling jacks, overhead hoists, and elevating conveyor, while the other two men are helpers who spot the trucks into position and uncouple the augers when they are withdrawn from the hole. Each 210-ft hole produces approximately 124 tons of coal. Due to over-lapping of the holes a shift-average of approximately 675-700 tons is realized. The maximum theoretical percentage of recovery is 78.5 percent if the holes are drilled tangent to one another and to the floor and roof of the seam.

End Use of Forest Products

By L. E. SAWYER
Director, Division of Forestry and Reclamation
Indiana Coal Producers Association

DURING the past year actual records of yields from forest plantings, on lands from which coal has been removed by open-cut mining, have been sought from various states. Unfortunately, in most cases no record had been maintained of the amount of material harvested. From the scanty records available, however, these plantings have proved not to be merely window dressing but a good investment which will yield periodic crops of forest products over the years to come.

The first products to be harvested from plantations will naturally be of small diameter principally for fence posts and other small dimension uses. Black Locust, the planting of which has been highly successful in some parts of the country but a complete failure in others because of depredations of the Black Locust borer, provides the quickest return.

An opportunity to actually record the volume of products from cutting on mined areas presented itself in Indiana this spring. The Enos Coal Mining Co. found it necessary to extend an empty-track through part of an area which had been planted to Japanese Red Pine and Scotch Pine in 1931. Detail specifications were furnished for acceptable material by the Indiana Wood Preserving Co., Terre Haute, and every effort was made to produce material which would meet requirements. This 0.9 acre tract produced 402 posts ranging from 6½ ft to 8 ft in length, 57 corner braces 10-12 ft in length and 28 poles 16-18 ft in length. Gross value of these products amounted to $293.47 for the 0.9 acres, a total yield of $326.10 per acre in a 20 year period.

Several important observations can be made from this cutting. First, logging of this mined area presented no difficult problem.

Second, the close spacing, followed in some earlier plantings, has not produced as much merchantable material per acre in a 20-year period.

Third, had the lower branches been pruned from the trees eight or ten years ago more poles and a much higher quality of posts could have been harvested and the job of peeling and limbing would have been materially reduced.

MECHANICAL MINING

Mechanical Loading with Bridge Conveyors

By A. B. CRICHTON
Vice-President
Johnstown Coal & Coke Co.

OVER a period of the past 11 months, loading machines, with bridge or "piggyback" conveyors, of the Johnstown Coal & Coke Co., Johnstown, Pa., have been loading coal over 50 percent of potential loading time. This high per-

centage of loading time is attributed to the use of these turn to continuous or other type equipment.

Faced with the problem of increasing production to decrease costs at their mine in Nicholas County, W. Va., the company considered several mining machines. Realizing that in mechanical mines, loading machinery is actually loading coal only a portion of available time, it was decided to try to make present equipment more efficient rather than turn to continuous or other type equipment.

The Nicholas County mine is in the Sewell Seam, varying in thickness between 30 and 55 in. It is an all belt-conveyor mine with four miles of 30 and 36-in. conveyors.

Search for a more continuous loading arrangement resulted in the development of a unit employing conventional equipment with a significant but simple and inexpensive addition. This innovation is a bridge conveyor which links a 12-BU loading machine, to a chain-flight conveyor and permits the loading of coal at the face, almost without interruption. Carried on a four-wheeled "dolly" which travels back and forth on the flanged conveyor line pans, the discharge end has a 180 deg "wishbone" pivot, permitting the unit to load the room or entry conveyor, positioned at an angle of 90 deg to either side. A 180 deg pivot at the point where the conveyor joins the loader permits a complete 360 deg action of the loading machine about the conveyor. The unit can reach 35 ft to either side or ahead of the conveyor line.

"Piggyback" conveyors draw power for their own motors from the loader through a short cable. Each producing face is provided with a bridge conveyor unit, while the loader serves an entire section. The loading machine is quickly detached from the conveyor unit to move from face to face.

The operator can devote his full attention to the coal in the face, where it should be. Because the discharge end of the machine is always over the conveyor, the operator does not have to look back to spot his transportation medium. No tramming is necessary, or possible, which increases efficiency. There is no spillage and, consequently, no rehandling of coal.

Another problem which confronted the company in the operation of an all-belt mine was regulation of flow. To avoid spillage it was learned that a 30-in. belt moving 400 fpm could not be loaded at a rate greater than six tons per minute or a 36-in. belt, eight tons per minute. The 12-BU loader is its own regulator. Average loading rate with this machine at this mine is 0.7 tons per minute, or about 40 tons per hour.

The goal set for this loading unit is 150 tons per unit shift or a total loading time of 3¾ hours at the aforementioned rate. Loading machines would then be operating 57 percent of available time. At this mine the "piggyback" units have operated as high as 77 percent of available face time.

Mobile Equipment in 30-Inch Coal

By IRVIN C. SPOTTE
General Superintendent
Princess Elkhorn Coal Co.

THE Princess Elkhorn Coal Co. operating two mines at David, Floyd County, Ky., was faced with a decreasing coal thickness and a corresponding increasing cost of production. In coal above 36 in., 14-BU loaders with shuttle cars averaged from 175-185 tons per shift. However, within five years all the remaining coal reserve will average 33 in. and will range from 28 to 36 in. To mine coal under 36 in., shaker equipment was introduced in 1944; these units averaged 90-100 tons per shift. This was a big tonnage drop from the mobile units and also introduced the problem of having two methods of mining within the organization. Under the circumstances the management could not be satisfied and wished to standardize on mobile off-track equipment. This was prompted by several reasons:

Natural conditions of good top and bottom without severe grades was favorable for mobile equipment. There existed an organization trained to operate and maintain loading machines and shuttle cars in low coal. Mobile equipment eliminated heavy lifting, dragging and handling of equipment. Working in low coal is more tedious making it difficult to obtain a fair day's work. "Put it on wheels, as everybody wants to ride while working," was frequently heard.

Conferences were held with the Joy Mfg. Co. to determine general specifications. They were decided upon as follows:

Loading Machine:

Height	24 in.
Capacity	5 tpm
Tramming speed	50 fpm
Maneuvering speed	35 fpm
Boom thickness	9 in.
Coal clearance	12 in.

Shuttle Cars:

Height	24 to 26 in.
Capacity	2 tons
Unloading speed	30 seconds

One year after the initial conference, the first unit consisting of a 20-BU loading machine and two 8-SC shuttle cars was operating in the No. 1 mine. The performance exceeded expectations but, as could be expected, some "bugs" did develop although the shuttle cars were almost trouble free from the beginning. The seam is from 30 to 33 in. thick and with this unit the 136 tons per shift now being produced is approaching the goal of 165 to 175 tons that was set, studies have indicated that, with the necessary improvements on the loader, this is attainable.

A five heading system is used with entries driven 20 ft wide on 60-ft centers; break throughs 18 ft wide are turned on a 60-deg angle to facilitate shuttle car travel. Rooms 28 ft wide on 40-ft centers are turned from one side of the headings and are usually driven in sets of five or six to a depth of 300 ft. Pillars are not removed and recovery will average 75 percent.

Main Entry Development in Low Coal

By W. D. HAWLEY
General Superintendent
Eastern Gas & Fuel Associates

MR. HAWLEY'S paper appears in full in this issue beginning on page 39.

Mechanical Mining in Anthracite

By ELMER F. YOUNG
Mining Engineer
Philadelphia & Reading Coal & Iron Co.

CERTAIN types of mechanical equipment have been used in the Western, Middle, and Southern Anthracite coal fields for many years. Their use has resulted in greater miner efficiency, but there are instances, where existing equipment cannot be used because of weight and rigidity.

Maple Hill colliery has operated continuously since 1890, mining coal from 12 veins which range in thickness from 6-50 ft on pitches from 0-60 deg.

Reopening of closed haulageways to recover pillar coal was found uneconomical because of vein structure and overlying strata conditions. It became necessary to drive new haulageways in the bottom rock underneath the veins.

Rock holes on a 35-deg pitch were then driven from the haulageway to each individual pillar. A chute 11 ft wide and 8 ft high is then driven in the pillar with the pitch of the coal bed until it holes into the overlying robbed mine workings, and the coal on either side of the chute skipped back, robbed, and transported to the top of the rock holes by shaking conveyors, scrapers or belts, where it is discharged into mine cars on the haulage gangways. The coal mined in driving the chutes and robbing is loaded on the conveyors by hand. This delays both chute advancement and production.

It is the opinion of the coal company officials that, if the coal mined in the pillar holes could be loaded mechanically onto the conveyors, it would increase development, yardage, production, and enable additional recovery of coal left in pillars. The conventional duckbill was tried, but found to be impracticable for use in many areas in this region. Due to the limited size of openings governed by roof and rib conditions—and the weight of this type of loading equipment, which made it difficult to move from one face to another.

These conditions were discussed with representatives of the Goodman Mfg. Co. and it was decided to develop a light, flexible duckbill that could be readily moved from one working face to another, easily handled in the rock holes and extended at the working face by two miners in as short a period of time as possible. After due consideration and planning, a miniature duckbill called the "Duckling" was built and put into operation in Maple Hill mine, December 5, 1950. The "Duckling" weighs approximately 450 lbs and consists of a loading head 32 in. in length by 30 in. in width, with a telescopic extension trough and driving mechanism 10 ft long giving a total over-all length of 12 ft 8 in.

In advancing the pillar hole the miners drill, load, and fire 10 eight-foot holes per cut which produce five cars or 630 cu ft of coal per shift. This coal has been loaded with the "Duckling" in 25 minutes. Three-piece timber sets with seven-ft collars are carried from the top of the rock hole and stood, lagged and cribbed, for each cut. The face is then squared off and made ready for the next shift's advancement. During the first half of December 1950 a pillar hole driven with this method, advanced 4.7 ft per day more than an adjoining pillar hole driven in the conventional manner, while production increased 4.4 cars or 12.3 net prepared tons per day.

Mechanical Mining in Anthracite

By W. I. STONEBRAKER
Superintendent
Hudson Coal Co.

MANY years ago the anthracite operators of the northern field began to experiment with mechanized equipment for mining, and for loading and transporting coal from the working face to the mine car in order to offset increased cost of production. Undercutters, compressed air and electric drills were introduced for mining the coal. The double drum scraper loader, a direct development of the northern anthracite field, provided an economical method of mining thin beds by dispensing with the costly process of cutting top or bottom rock to make sufficient head room for the mine car to pass to the face. Scrapers of this type are still used quite extensively for mining coal as low as 18 in. in thickness.

Of all the conveyors developed, the shaker chute emerged as the most useful in the recovery of pillar coal from areas previously first mined. Pillars that were left in the original mining proved inadequate to support the roof and as a result, squeezes developed causing it to collapse and completely fill the mine openings. The flexibility and small size of the shaker conveyor made it possible to take narrow skips following the irregular lines of these pillars and also to confine openings through caves between pillars to much smaller areas.

One of the more recent developments for the anthracite region has been a small size duckbill manufactured by the Goodman Mfg. Co. known as a "Duckling." The first application was in advancing a narrow face for a distance of 250 ft from a tunnel between two coal beds to a point where a rock hole could be driven for the return air course. The place was 12 ft wide in a very dirty bed consisting of 44 in. of coal in three benches and 47 in. of bone and rock. Grades varied from 18 percent to the rise to three percent to the dip. Two men were employed on each of two shifts per day and with the aid of the "Duckling," and they were able to increase their performance 23 percent over the former method of hand shoveling to the conveyor.

Its most recent application is in drawing pillars in a seam consisting of 16- and 30-in. benches of coal, separated by 20 in. of bone and rock, where close propping is necessary for roof control. The small crosscut drive can be quickly assembled to give any desired angle to the pan line along the pillar face and the "Duckling" is easily maneuvered in the loose coal between props and timber. Loading time has been reduced with a consequent increase in production.

Another very successful application of machinery in connection with recovery of pillars was in reopening a section of an upper bed that had been first mined 75 years ago. A Joy loader was put in service cleaning up a gangway and aircourse driven in the original mining. Caves from 4 to 14 ft thick were cleaned with the rate of advance amounting to more than three times that obtained by the old method of hand loading into mine cars. A timbering machine, built in the colliery shop, was used to expedite the work of standing heavy timber for roof support. The results of these experiments, using mobile loading machine and timber setter for reopening development and shaker conveyor with light weight duckbill for pillar removal, indicate that it will be possible for us to obtain maximum recovery of coal at a reasonable profit from all old pillar areas.

SAFETY

Protection Against Electrical Hazards in Coal Mining

By GEORGE C. BARNES, JR.
Professor of Electrical Engineering
Virginia Polytechnic Institute

IN discussing safety trends, modern mining demands the consideration of both dc and ac underground. In the past, only dc application of electricity needed consideration. It still represents the major use but ac application is growing and must be considered henceforth.

Direct current is generally applied to coal mining at 275 v, or less, although there are still a few 550-v systems in existence. With 275 v, electrocution is not a great hazard, except where the victim is in solid contact with a positive and negative conductor simultaneously. Proper gloves and shoes should, in most cases, provide protection against electrocution. In recent years a great portion of the machines operated at the working faces have been equipped with frame grounds, or solid metallic connections of the frame to the negative portion of the circuit. This has been to maintain the frames at ground potential and eliminate the shock hazard. Such a ground will reduce the incidence of shock, as expected, but probably increases the severity of any shock received.

The frame ground, aimed at elimination of shock is of doubtful value, and increases the hazard of ignition. It has been found, in the laboratories of the Virginia Polytechnic Institute, that a 350-amp arc will burn through ⅜ in. of steel in about nine seconds. Obviously, the usual 400-amp machine fuse will not interrupt such a current. It has also been determined that a 600-amp arc will burn through ⅜ in. of steel in about one second. This current requires no less than 20 sec to open a 400-amp fuse by actual test. It seems obvious then, that the frame ground might produce ignition when used with fused circuits and where frame grounds are used, only a circuit breaker actuated by a ground current trip relay will result in a safe condition. Construction of circuit centers involving the trip relay, and the interest of the industry in ground current tripping are both encouraging trends in the direction of safety.

Encroachments of ac energy in coal mining appear to constitute a great trend towards safety. The reasons are not difficult to understand. Application of three phase squirrel cage type induction motors to mine usage eliminates the spark-producing commutator and brushes. The ac motor, even though not permissible, must suffer a winding fault to be dangerous unless motors involving collector rings in their construction are used. Even with grounded machine frames and grounded circuits, a winding fault in an ac moter would not be so liable to burn through a permissible machine frame as it would in a dc motor. In the ac system of mining small transformers, filled with inert material, replace the ac to dc substation. These can be moved so easily, and are so inexpensive, that separate transformer banks with each operating section or unit, moved ahead as the section advances, is common practice.

In mining systems with dc powered haulage, underground safety is increased if the secondary conveyor haulage and face machines are operated by ac equipment. The bare trolley wire is not introduced into areas near the working faces; neither is arc-producing dc equipment. In short, the most dangerous sections of the mine are powered with the safety enhancing ac circuit.

Advances in Illumination for Mines

By C. M. CRYSLER and G. F. PRIDEAUX
Lamp Department
General Electric Co.

A mine-lighting committee has recently been established by the Illuminating Engineering Society to study the visibility of mining tasks and prepare lighting recommendations. This committee has barely begun to function. Hence the suggestions offered at this time are entirely without the benefit of the studies this committee will make but are based on studies and observations of the General Electric Co.

The work light in mines now and for a long time in the foreseeable future is the miner's cap lamp. Over a period of years improvements have been made until today lamp models are very superior products. Other illumination at the face is furnished by machine lights whose design and placement needs considerable study. Since bulbs on mining machines are subjected to shock and vibration, every effort should be made to use lamps having rugged filaments. A third class of lamp that can be used in the face area is the portable, permissible floodlight unit. This is particularly useful when suspended as close to the face as possible so that the direct light will not have to penetrate dust caused by cutters, loaders, etc.

Surfaces should be made white so that dark objects such as machines, lumps of coal, men, tools, etc., viewed against them will have a high contrast.

Haulage locomotive headlights have received considerable attention recently. Since these lamps are operated in series with resistors, it is very important that they be operated at the current for which they were designed. In haulage entries and other fresh air areas where the lamps can be left up for an appreciable length of time, 20-watt fluorescent lamps should be used instead of 50-watt filament lamps. The brightness of the fluorescent lamp is materially lower than that of the incandescent lamp, and is therefore less glaring, especially when mounted with the axis of the lamp along the axis of the entry or haulageway. It is estimated that lamp and power cost of the fluorescent system will be less than one-half that of an incandescent system—and the fluorescent system will provide twice as much light.

In closing, it is proposed that each mining company assign one good man with mining experience the sole job of improving SEEING in the mine. He will need three basic tools for this work—a visibility meter, a brightness meter and a light meter.

Permissibility of Diesel Locomotives for Coal Mining

By J. H. EAST, JR.
Regional Director
U. S. Bureau of Mines

A layman's common conception of a Diesel engine usually is gained by following a Diesel truck uphill through a trailing cloud of black, smelly smoke that blankets the highway. This is not true of Diesels used in underground haulage—if it were they could not be used.

Diesels have been used successfully in Europe for 30 years. Coal mine atmosphere and ventilating problems in Europe are the equivalent of those in the United States, and their mines are basically the same as ours, from a health standpoint. Thus, the use of Diesel locomotives in coal mines is not an experiment, nor is it anything new—except in the United States.

One prime prerequisite to the successful use of Diesel locomotives in any mine is adequate ventilation. A Diesel locomotive's exhaust fumes contain harmful, toxic gases that must be diluted to prevent danger to the miners. This sounds serious but, in reality, it is not a difficult problem. To dilute exhaust gas to a safe atmosphere for miners to breathe requires approximately 75 cu ft of air a minute per brake horsepower of the Diesel engine. In other words, a 50 hp engine would require an additional 3730 cu ft of air per minute over the minimum quantity needed to maintain the air quality required by law.

In this country, organized labor's opposition to the use of Diesel-powered locomotives in underground coal mines is based in part on the Federal Mine Safety Code for Bituminous and lignite mines, which has been made a part of the "Agreement" between the coal mine operators and the United Mine Workers of America. The code provides under Article VII, Section 5(a) that "Nonpermissible internal-combustion engines or other machinery which gives off noxious fumes shall not be permitted underground in any coal mine." Once certification is obtained in compliance with the code, it will remove much of labor's honest and sincere belief that internal-combustion powered equipment of any type is a menace to the health and safety of the workmen when operated underground.

Trolley locomotives have advantages but they also have disadvantages. The "hot" trolley wire overhead is one of the latter. Bureau of Mines statistics show that at least 67 men were killed by contact with trolley wires or trolley poles in coal mines of the United States from 1940-1949. Mine fires have been caused by falls of roof

on trolley wire, and these same trolley installations have been the ignition source for gas and dust explosions. From the safety angle, Diesels used in European coal mines have a very enviable record. From the cost standpoint, Diesels eliminate the need for dc power in the mines, together with the expense of bonding track and hanging trolley wire.

CONTINUOUS MINING

The Mining Development Committee and Continuous Mining

By GERALD VON STROH
Director, Mining Development Committee
Bituminous Coal Research, Inc.

PRESENT developments of continuous mining machines are capable in their ultimate refinement of producing better than two tons per minute, mean average, and some developments in continuous face transportation can ultimately convey more than two tons per minute. This means 840 tons per machine per shift. It is generally conceded that these machines will most effectively work in pairs or produce 1640 tons per shift per section. How many operators today can handle 1640 tons per shift from a section? Remember this 1640 tons per shift per section is not for high coal, but for medium seam heights. Low coal production should ultimately be about as good, and high coal production even greater.

What about mine projections? While most of the machines being developed today are designed to work under existing projections and systems, it is only reasonable to presume that maximum effectiveness will result from modification of present systems. Just as mechanical mining became more effective in many mines by a change in mine projections.

To make this complex system of continuous mining a reality in the shortest period of time will require substantial improvements in most elements of mining, such as illumination, ventilation, supply handling, etc. In our opinion, it is not too early for the industry to give these matters thought, and voice their opinions and ideas. Remember most of the improvements and ideas for machines used today originated with the operator, who is in a better position to see the needs of the industry.

Continuous Mining Test Unit No. 2 designed and built by the Mining Development Committee is an industry sponsored development and represents the combined thinking of a very large segment of the industry. As the name implies it is not a final continuous mining machine—though it can function as such—but a portable laboratory. The mining head, or rotor, which may have one or more arms, cuts a circular groove in the coal to provide expansion space. An outsized wood-screw in the center called the "burster" exerts a wedging force and breaks out the coal. The diameter of the circular groove is the same as the seam height. The rotor on Test Unit No. 2 covers a range of 28 to 38 in.; the arms, controlled by a lever at the operators station, being moved radially in and out.

The burster or wedge idea is not new, and appears in some of the very earliest patents. It appears in a patent issued to Joe Joy in the middle 20's, as part of a machine to make or drill cross cuts. Credit for the first large scale application of this burster in the mining industry should go to Mr. Compton of the Grafton Coal Co. who applied it to a high wall auger mining.

The Joy Continuous Miner

By A. LEE BARRETT
Research Engineer
Joy Mfg. Co.

IN the past two years great advances have been made in the art of continuous mining. As a result of the experience gained from well over 100 operating machines in the field, new models have been brought out in both the high and low type Joy Continuous Miner. These new models provide for greater convenience in making necessary operating adjustments. More complete accessibility has been provided throughout the machine. Of particular interest are changes in hydraulic design to provide more trouble-free operation and greater continuity of service.

A great deal of experimenting has been done with respect to the ripper bar itself and as a result of the progress made the coal size below 3/16 in. in the average operation, has been cut to less than half that formerly produced. The new ripping head will reduce maintenance costs to approximately one-third or less of that which has been experienced to date.

Bit life on the basis of tests run to date is approximately six to ten times greater than that where a normal chain ripping head is used. In addition the machine operates more smoothly so that less strain is put on the structural parts.

Research has been carried on with respect to control of dust. One of the newer approaches is the use of a foaming compound which provides a high velocity spray of foam over the bar, cutting water consumption to approximately one-third of that used with ordinary spraying equipment and at the same time providing considerably increased dust reduction and better visibility.

One of the important advances in connection with continuous mining is the new extensible rubber belt with mobile head and tail pulleys. This will allow a continuous and uninterrupted transportation system behind the miner. It will provide for a greater percent of operating time and in many instances may double the output of a continuous miner in a given shift.

The Goodman Mining and Loading Machine

By M. F. CUNNINGHAM
Vice-President
Goodman Mfg. Co.

GOODMAN mining and loading machines consist essentially of three parts; a main chassis mounted on caterpillar treads, a rear conveyor which swings through an arc of 90 deg, and a cutting and loading element which also swings through a 90-deg arc.

The mining head has an over-all mining width of 3½ ft and consists of a cylinder held between two parallel arms, driven by two cutter chains. The digging cylinder has five cutting discs spaced on six-in. centers. Each disc contains eight bits. Also, rigidly mounted to the cutting cylinder are ten conical shaped roller wedges. There are 19 cutting bits in each of the two driving chains, thus making a total of 78 cutter bits in the entire mining head.

Each of the five discs on the cutting cylinder is set to cut kerfs 2½ in. wide. The two driving cutter chains cut 4¼-in. wide kerfs, leaving a 3½-in. core between each cut. Cores are wedged off by the conical roller wedges. Thus 50 percent of the mining is accomplished by cutting 50 percent by wedging.

Cutting can be done from six in. below the mine floor to 64 in. above the mine floor, giving a total range of 70 in. The cutting head can be sumped to a depth of 18 in. with the main chassis of the machine remaining stationary.

A complete cycle consists of sumping the head to a depth of 18 in. at the top of the seam, cutting downward to the mine floor, withdrawing 18 in. and swinging over 42 in. and upward to complete the cycle.

Immediately below the cutting head is a gathering or loading head similar in design to those used on conventional track and caterpillar mounted loading machines. This head normally floats along the mine bottom, but it can be raised or lowered by hydraulic power for tramming purposes. The coal taken from the face falls directly in front of the loading head and is picked up by it and placed on a through running chain conveyor.

Two 75-hp continuous rated water cooled motors drive the cutting and loading mechanism. One eight-hp motor is used to drive the main conveyor, one 7½-hp motor to drive the two tandem hydraulic pumps, and two 7½-hp motors to drive the caterpillars for tramming. There are, therefore, a total of six motors on the machine, totalling 180½ hp.

Over-all dimensions of the machine are 27 ft long by 90 in. wide by 34 in. over-all tramming height. The minimum width of working place is 10 ft, the maximum width is 18 ft, while the coal line height is 28 in. and the conveyor width is 20 in. The machine will turn a 12-ft cross cut 90 deg from a 12-ft room or entry. The operator is 15½ ft from the coal face.

The Colmol and Intermediate Transportation

By H. L. THOMAS

Jeffrey Manufacturing Co.

WHEN operating the Colmol, mounted on caterpillar tracks, moves forward into the solid and unshot seam of coal, simultaneously cutting and loading a face 9½-10 ft wide by the height of coal. Mining of the coal is done with rotary breaker heads, positioned in horizontal rows (the lower and medium seam units employ two rows, the high model three rows), mounted on gear cases which can be raised or lowered in unison or expanded and contracted to regulate the cutting height of the machine.

Breaker heads are designed and mounted so they may be stopped at a position where they are all confined within the dimension of the gear cases. Thus, the machine may move freely forward, backward or on an angle within the space it has cut. Half the breaker heads turn clockwise and the other half counter-clockwise, all turning toward the center of the machine, thus sweeping the coal to the conveyor where it is picked up and carried to the rear and discharged into the intermediate haulage medium.

Knowing the high per minute productive capacity of the Colmol, work was started some time ago to develop a piece of equipment for moving the coal, not intermittently but *continuously* from behind any type of continuous mining machine. A train of belts mounted on frames and pneumatic tired wheels, which permit the unit to "snake" between the face and the main transportation system, through entries, cross cuts, or rooms, and around corners was developed, and named the "Molveyor."

A unit 300 ft or more in length is self-propelled and made up of individual sections, each having its own tram and belt motor. It is always connected in a train, and sections are not added to the unit as it advances nor are they taken out as it retracts. When the mother conveyor has been extended to the new mining area, the Colmol starts to mine near the receiving end and the Molveyor advances, parallel to the mother conveyor. The receiving end of the "Molveyor" receives coal from the Colmol without spillage and carries it to the mother conveyor in a steady stream—up to four tons per minute—then discharges the coal on the mother conveyor likewise without spillage. This permits mining for a distance of 300 ft in any direction, right, left, or straight ahead from the tail end of the mother conveyor.

Both "manual" and "automatic" control switches are placed on the receiving end of the Molveyor. When on "automatic," it moves forward in six-in. steps. If on "manual" the man at the loading end has push button controls for tramming and stopping and starting the belts, emergency stop switch, and a telephone to communicate with the man at the discharge end. The discharge end is equipped in the same manner with the addition of a hydraulic pump control.

Lee-Norse Miner

By E. M. ARENTZEN

President

Lee-Norse Co.

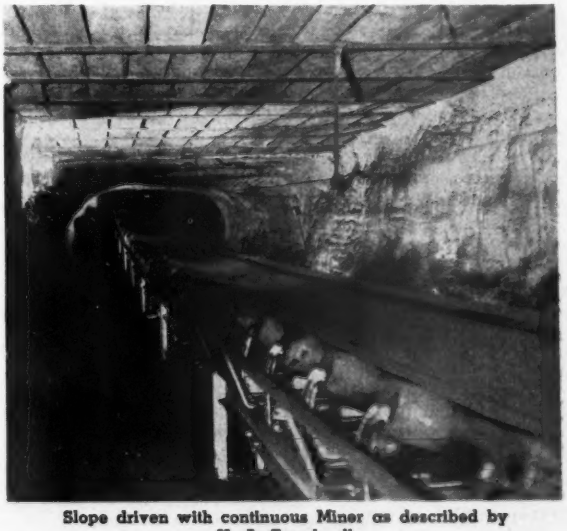
THE Lee-Norse KOAL-MASTER is a coal cutting and loading machine of the continuous type. It introduces a new method of cutting and dislodging coal from the solid seam. It is the first machine to cut diagonal intersecting kerfs continually thereby developing diamond shaped projections in the coal face. These projections are easily broken off as the machine advances into the coal.

Designed for high coal and full entry cutting the first model built will cut a place 12 ft wide and can work in coal seams 5-8 ft high. Over-all dimensions are: 48 in. high, 96 in. wide, 25 ft 7 in. long and 20 tons total weight.

Elements of the machine are a four wheel rubber-tired chassis—two wheel drive and two wheel steer—with all necessary traction drive units. Mining is done by cutter heads carrying five "cutting wheels." These are spaced 15 in. apart and oscillate approximately the same distance. On each cutting wheel can be mounted a maximum of eight "cutter arms" and "bits." Each wheel is drilled to permit changing the number of arms and bits with eight as a maximum. Tests show four arms are satisfactory for the Pittsburgh seam of coal.

On the chassis is mounted a conventional flexible type conveyor and gathering head similar to mobile type loading machines. Above the gathering head and conveyor is mounted a "cutter boom." This cutter boom consists of a heavy steel structure hinged at the rear and to the chassis with two "cutter heads" mounted on the forward end.

Cutting operations are accomplished by simultaneously rotating and oscillating the cutting wheels in such a manner that each cutting bit moves in a diagonal path. These paths are automatically reversed by the oscillatory



Slope driven with continuous Miner as described by H. A. Treadwell

motion so that the result is a series of diagonal intersecting kerfs. The present machine has been geared in such a manner as to produce one revolution of the cutting wheel while the cutting head moves from center position to the extreme outer position and back to center again; in other words, one revolution for each oscillation.

All cutting bits are identical and travel at the same speed. They are mounted on a solid tool holder with heavy shafts and antifriction bearings. Deep penetration of each bit results in coarse cuttings instead of the conventional bug dust. This method of cutting coal with a milling cutter produces the diamond pattern only in the direction in which the cutter is fed. Therefore, the roof and floor, as well as the ribs, are smooth.

Sumping force is produced by a combination of traction by the rubbertired wheels and special rib jacks. This works very satisfactorily but further improvement in the arrangement of the cutters might permit sumping without the aid of the rib jacks. The machine is equipped with two roof drills, one on each side, which are hydraulically driven and have a low gear for setting roof bolts.

Coordinating the Auxiliary Operations of Continuous Mining

By THOS. L. AITKEN
Vice-President, Operations
Ebensburg Coal Co.
and
HAROLD B. WICKEY
Vice-President, Operations
Pennsylvania Coal & Coke Corp.

COINCIDENT with the introduction of continuous machines, problems are presented to the operator which involve the entire operation from the face to the point of delivery on the surface. Problems which must be successfully solved if the potential capacity of the machine is to be reasonably approximated, are the proper maintenance of equipment, ventilation, dust control, roof support, supplies, communication, rock handling, drainage, power, and transportation. Some of these factors will not have to be modified as their function is not disrupted.

In conventional mining one could consider a ventilation problem and a dust control problem as separate items. It is found in continuous mining that effective dust control is impossible without proper ventilation. Continuous mining machines have not introduced any new problem in ventilation; they have merely emphasized the need for getting air to the working face. Adequate control of dust cannot be accomplished by ventilation alone, and it has been found necessary to use water to knock down the dust particles.

The speed with which continuous machines can advance makes it necessary that the timbering phase of the mining cycle be greatly modified. Under good roof conditions, where posting is the only timbering necessary, it is entirely possible that adequate roof support can be maintained without interruption to the continuous flow of coal from the face. But in conditions where cross timber must be added to give support to the roof, the conventional method of timbering cannot be utilized without seriously interfering with production. Therefore it is necessary that more use be made of roof bolting.

It is believed that the greatest modification that must be made in the mining cycle is in the transportation system used to carry the coal from the continuous mining machine to the loading head of the belt or the mine car. At present there are several methods being tried in which attempts are made to eliminate the delays caused by conventional transportation systems.

Methods must be devised to get maximum tonnage per unit setup. From the relatively short period of time that continuous mining machines have been used, it would appear that the conventional room and pillar system, adopted years ago to accommodate hand loading, is obsolete. Under most room and pillar systems the rooms are not driven more than 300 ft, and it is not necessary that continuous mining machines be limited to 300 ft. The longer period of time that the machine can be used in continual advance the more efficient will the operation become.

Modifications in supervision must also be made if all phases of the mining cycle are to be properly coordinated. Gone are the days when a supervisor was adequate in all respects if he knew something of mine timbering, mine safety, could carry a flame safety lamp, and make a mark with a piece of chalk. Today the supervisor must have a broad and detailed knowledge of mining.

Slope Driving With a Continuous Miner

By H. A. TREADWEEL
Vice-President
Chicago, Wilmington and Franklin Coal Co.

MR. TREADWELL's paper appeared in full in the May issue of MINING CONGRESS JOURNAL.

INDUSTRY MOBILIZATION—COAL UTILIZATION

Problems of Industrial Mobilization

By ARNOLD LEVY
Counsel
Coal Defense Committee

USING the announced title of the subject as a springboard, Levy prophesied that coal will be called upon to do a great many things and that the mobilization pattern will run true to form, posing situations leading to tight transportation, manpower and materials. These problems can be solved by industry representatives already in Washington like the American Mining Congress, National Coal Association and Coal Defense Committee.

One of the frustrations faced by coal is due to the multi-small-unit aspect of the coal business. No one company is financially large enough to carry out research programs comparable to those which any one of several oil companies can finance. Another is the need to dispel the uncertainties in the minds of purchasers as a result of past work stoppages. The statesmanship and intelligence displayed on both sides at the recent contract negotiations should be preserved and employed in future conferences.

The speed and simplicity evidenced in those negotiations have already gone far toward dispelling the impression of uncertain supply from the minds of many large purchasers of coal, including government. In educating government and the country to accept the fact that coal must be encouraged, not discouraged, the improved labor relation should be beneficial. The fates of the United Mine Workers, the coal company president, the stockholders, and the country are so interdependent that all must work together.

The public and the government must be enlightened on the importance of percentage depletion to maintaining a sound incentive in the coal industry. The attitude of the Treasury Department that percentage depletion is just a windfall is due to misunderstanding, not politics. The economics and technology of coal, its needs and requirements, must be put over intelligently.

There are other complicated obstacles which confront

the industry, that no single company can ever resolve by itself. They are national in their scope. One of these is the freight rate structure. Coal is carrying too much of the revenue load of the railroads. The great financial problems of the carriers are recognized, but, should the railroad's problems be solved at the cost of creating further problems for coal? There is ability and vision enough in the coal mining industry to work out a more intelligent application of the freight rate structure through cooperative action.

Foreign oil poses another problem which will require intelligent collective action for solution. The industry needs qualified technicians of over-all economic ability who can come to grips with questions like these.

The coal industry today is so far removed from the provincial mining town; so much a part of what happens everywhere in the world and so involved in transportation that it is impossible to make a national approach to any coal industry problems without affecting every facet of the country's economy.

In building for the years ahead, the coal industry should not only comb the field for future salesmen and superintendents, but also for young men who are potentially the type of broad-gauge economists who can master national situations.

This nation is in the midst of a fuel revolution. The next decade will tell whether coal is going to develop an allied, integrated synthetics industry or whether the oil industry or chemical industry is going to come along and use coal mining as just a supplier of raw material. Here again the small business characteristic of no single company being able to finance the research that is necesary must be faced.

Since coal must be the long-range reliance of the Government, everything must be done to facilitate its production and to conserve other fuels for those purposes for which there are no substitutes. There's a long, hard road ahead but, if enough interest in the industry can be developed and the kind of talent called for can be attracted, the coal industry will be successful in developing the governmental viewpoint.

Research for Future Uses of Bituminous Coal

By A. A. POTTER

President

Bituminous Coal Research, Inc., and Dean of Engineering, Purdue University

FEW realize that bituminous coal is consumed today in greater tonnage than any other commodity produced; that it provides more heat, hot water, and electric power to more homes, plants, and buildings than ever before; that the revenue tonnage of bituminous coal originating on U. S. railroads is greater than the freight tonnage of all manufactured products; or that bituminous coal supplies most of the fuel for electric power generation, for space heating, for industrial furnaces and for smelting of metals. It is a source of raw materials in the production of many chemicals; and is in greater demand today than in prewar years.

Indications are that by 1960 this country will be consuming at least 475 billion kilowatt-hours of electric power or nearly double the present rate. To meet this increased demand, which will have to be generated largely in steam plants, the coal industry should aid in research projects to improve combustion on pulverized coal and stoker fired furnaces with a great variety of coals, including those with a high ash content. It should actively aid in developing large gas turbines for electric power generation with pulverized coal or producer gas as fuel. It should aid in determining practicability of more rapid introduction of the electric furnace in the steel industry. It should aid in extending railroad electrification to areas which are economical. It should aid in developing the heat pump for comfort cooling and heating, and should undertake other projects, cooperatively with the electric power utilities, which will extend the use of electricity.

More fundamental long range research is needed in order to insure a sound foundation for applied coal research of tomorrow. Factual data are needed on the relative cost of transporting coal by rail, barge, truck, belt conveyor, and pipe line; the protection of fine coal during the shipment; and the practicability of sealing of stock piles against moisture infiltration. More knowledge is needed to develop a coal-fired equivalent, or the nearest approach, to a package power plant. In the interest of national security, we must develop a practical and economical means for converting oil fired residential and industrial equipment to coal. Synthetic gasoline is particularly important in the interest of national security. More knowledge is needed about the potentiality of coal as a raw material for chemicals, drugs, and fertilizers. This country is even now short of benzene, phenols and toluene, and other chemicals needed in medicine, plastics, synthetic rubber, nylon, and explosives.

Research may pave the way whereby our steam-electric power plants of the future will be operated in connection with chemical industries, and heat for steam generation will become an inexpensive by-product with a great array of chemicals and gases evolving from the raw coal.

New Developments in Coal-Burning Locomotives

By G. D. CREELMAN

Director of Research

M. A. Hanna Co.

THERE has been a steady improvement in steam locomotive efficiency. In the last 30 years the average coal consumption of freight locomotives has dropped from 170 to 110 lb of coal per 1000 gross ton miles, an improvement of about 35 percent. Passenger locomotive performances have improved 15 percent over the same period. Further improvements are possible without equipment changes through the use of prepared coal.

Until recently the coal producers and the railroads have cooperated to perpetuate the use of low-grade coal as locomotive fuel. A very high percentage of locomotives were operated on mine-run coal without any washing or size preparation. Over the past ten years a long series of tests and demonstrations have proved that savings of about 20 percent of fuel cost can be achieved even though prepared coal costs more than run-of-mine coal.

Steam locomotives are severely handicapped as power plants because only a relatively small combustion space can be provided for very large heat release. Flue gas velocities are high and as a result, there is a very large carry-over of partly-burned fine coal and cinders. Changes in the firebox have resulted in some improvement. The recovery of cinders from the front end before they pass out the stack is a subject that is still under investigation. On some railroads, smoking locomotives have become a thing of the past with the application and proper utilization of smoke-eating over-fire air jets.

Six years ago, a group of the coal-carrying railroads and coal producers joined with B.C.R., Inc., to set up the Locomotive Development Committee, to develop a highly-efficient coal-burning locomotive which could meet the competition of the diesel. The Committee was confident that, given enough hard work, the gas turbine could be made to burn coal with an economy which could surpass the diesel's excellent performance.

Full-scale tests are being conducted by L.D.C. at Dunkirk, N. Y., in the shops of the American Locomotive Co. The experimental gas turbine that has been used on these

tests has recently concluded its fourth series of 250-hr test periods, a total of 1000 hr of intermittent operation. The 3750-hp Allis-Chalmers turbine for the demonstration locomotive is now ready for test. It is equiped with all the automatic controls that will be used on the locomotive, and as soon as the stationary tests on coal are completed at Dunkirk, the power plant will be installed in a locomotive chassis and there will be a coal-fired gas turbine on the rails.

The modern diesel engine is doing a good job for the railroads. It is not generally appreciated, however, that the big new steam locomotives are giving just as good service to railroads where they are receiving the same kind of administrative and engineering attention that has been given the diesel. The coal-fired gas turbine locomotive is almost ready to enter a period of testing and shakedown in preparation for commercial application. In certain areas further railroad electrification may well give the diesel real competition and result in further increase of the coal market.

Cyclone Furnace Develops High Combustion Efficiency

By MERLE NEWKIRK
The Dow Chemical Co.

RESEARCH was started in the late 1930's to develop a more satisfactory combustion system. The problems posed by increased ash content of coal, slag deposition, limited building space, too small heat absorbing properties, and too high labor cost motivated the move. Specifications set up for such a system were: ability to burn coal completely with a minimum of air, precipitate the ash in a fraction of the space required in pulverized coal furnaces and greater efficiency. The cyclone furnace is one answer.

Experience showed that wet coal sometimes caused interruptions in coal feed, so a preparation plant was included in the design to crush coal to the desired size and dry it as needed. Raw coal is fed into a Bradford breaker which reduces it to a minus 1½-in. product. From the breaker it is fed into two 1100-ton silos. The coal then is drawn from the silos, dried, screened, and the ¼ by 0 fines are sent to the furnace bunkers. Coarse coal is recirculated.

Feeding fuel into a pressure area, one of the greatest problems is done by means of a flight conveyor passing through a star rotary seal. A steady stream of crushed coal and air is blown tangentially into a slightly inclined cylinder. Gases spiral around this cylinder towards its exit and the coal particles are thrown against the wall. Here they stick to the liquid slag and are constantly scrubbed by the hot oxygen-rich gases passing over them. Liquid ash drains down the cylinder slope onto the floor and through a small opening into a secondary furnace where it is tapped into a water filled ash pit. The ash is removed either with a hydro-jet or a hydraulic sluicing system.

After combustion, air and fuel admitted to the cyclone primary furnace, discharges through a conical opening into the secondary furnace where they are directed downward to sweep the molten slag on the secondary furnace floor. The flame and gases then turn through a slag screen and pass upward into the convection section where the boiler steam-generating tubes are located. From the convection section the gases flow downward through the first gas pass of the secondary air heater, over the primary economizer, upward and through the second gas pass of the secondary air heater into the primary air heater and out of the stack. All combustion air is supplied by forced draft blowers which make it possible to use air for combustion at from 750-800 deg.

Boiler problems have centered around coal feeder problems. It was thought a drying and preparation plant would solve fuel difficulties. A conditioning plant did solve feed problems and the furnace was able to burn a wide variety of coal. However, coals in which the ash content was high in iron continued to give some difficulty.

Coal In the Modern Crisis

(*Continued from page* 35)

this field. It remains only for private capital to take the initiative.

Centralized Industry Invites Attack

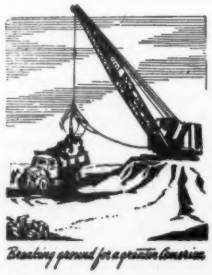
There is another consideration which must be borne in mind, namely the great need for the decentralization of industry. The threat of atomic warfare shows how unwise it would be to build new liquid fuel plants in those areas of the country in which heavy industry is already concentrated and which naturally would be the primary target for an enemy in war.

The hydrogenation of coal affords a new method of producing critical materials needed in war. We are short of benzene, toluene, pyridene, xylene and other chemicals which are invaluable in the production of explosives and aviation gasoline. The defense program provides for the construction of liquid fuels plants. It would be highly desirable and highly intelligent to make certain that such defense plants would be constructed in areas remote from those in which so much of our industry is presently concentrated.

Then, too, decentralization involves the avoidance of such concentrated economic control of this great new potential industry as would stimulate the demand for government to enter the field. We should therefore be impelled to make certain that the new industry shall be developed in the American way, namely that of free competitive enterprise.

Fears of loss arising from progress which changes old habits have never been realized, as the industrial and economic growth of this country amply demonstrates. When the standard of living of the masses is raised, new markets are created for every industry and a liquid fuels plant would be a direct benefit to every other producing or transporting industry. This becomes apparent when it is realized that liquid fuel plants would operate on a 24-hour schedule seven days a week and would thus create a huge new demand for the production of coal. It is estimated that a plant capable of producing 10,000 barrels of liquid fuel a day would need daily about 7600 tons of coal produced from mines operated not less than 240 days in the year.

The first obligation of America in this world crisis is to keep itself strong, and the citizen who would see the American way of life thrive in the present world conflict of ideologies must be able to see that all we are fighting for is opportunity for the individual. The Communist says that the individual cannot, in this scientific age, control either his political or his economic destiny, but must be content to become the pawn of the state. If we are to keep America strong enough to become an example to the people of the world, it must be an America in which the individual has freedom of opportunity.



Breaking ground for a greater America

Wheels of GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

CONGRESS has completed its work on the bill extending the President's authority to negotiate foreign trade agreements and on the Military Draft Act. The latter measure provides an 18½ year draft age, 24 months of service, lowered mental and physical standards, a five-million man limit on the armed forces, and a plan for a Commission to develop recommendations on universal military training procedure to be submitted to Congress in four months.

The House has cleared its appropriation bills and of these measures the Senate still has to act on those for Treasury and Post Office, Labor and Federal Security, Interior, Independent Offices, and Agriculture.

Some disposition also remains to be made of the Revenue Bill of 1951 and of the Administration's desire to extend and amend the Defense Production Act of 1950. There is talk of an August-September recess, and in this connection of a 120-day extension of the current Defense Production Act.

Taxation

Soon to be reported to the House, the Revenue Bill of 1951 may reach the Senate Finance Committee in time for hearings to begin June 18. Finance Committee leaders are not prepared to accept January 1, 1951 as the date for increasing corporate tax rates and it is their feeling that increases in individual income taxes will not become effective before September 1.

Thus far the Ways and Means Committee bill would bring an annual increase in revenue of around $7 billion. The measure imposes a 12½ percent increase in individual income tax rates, which would also apply to an individual's capital gains; a proviso limits to 90 percent the amount of an individual's total income that could be taken in taxes. The "normal" tax rate on corporations would be increased by 5 percentage points, from the present 25 percent rate to 30 percent. The first $25,000 of corporate income is subject to normal tax only and the rate for corporations earning $25,000 or less thus becomes 30 percent. The 22 percent "surtax" applicable to corporate income in excess of $25,000 remains at that figure, giving a combined normal and surtax rate of 52 percent instead of 47 percent as in the present law. The excess profits tax rate of 30 percent is also continued, thus giving a total rate of 82 percent on that portion of a corporation's income subject to excess profits tax, as compared to 77 percent in the present law. The corporation's excess profits tax credit is reduced from 85 percent to 75 percent of its earnings for the three best years in the four-year period, 1946-1949—to be effective January 1, 1951. The over-all tax ceiling, including surtax, normal and excess profits taxes, is raised from the present 62 percent to 70 percent.

Another committee action requires the withholding of tax at the rate of 20 percent on dividends, royalties, and interest paid by cooperatives.

Of great interest to mining is the adoption of a provision that all expenditures incurred in development of a mine, after the existence of ore in commercial quantities has been disclosed, be treated as deferred expense and not chargeable to capital account recoverable through depletion. Likewise important is the Committee's rejection of Administration demands for reduction in the percentage depletion allowances for producers of oil, gas, sulphur and nonmetallic minerals. In addition, the percentage depletion allowance for coal is increased from 5 to 10 percent. Added to the list of nonmetallic minerals entitled to percentage depletion are borax, Fuller's earth, refractory and fire clay, quartzite, perlite, diatomaceous earth, metallurgical and chemical grade limestone, and tripoli at a rate of 15 percent; and sand, gravel, granite, marble, stone, brick and tile clay, shale and shell, at a rate of 5 percent. The Committee voted to remove the restriction in existing law which allows the 15 percent rate to thenardite only when it is obtained from brines or mixtures of brines.

Washington Highlights

CONGRESS: Considers August recess.

TAX: Revenue bill readied for House.

SOCIAL SECURITY: Bill would protect "experience rating."

TRADE AGREEMENTS: White House receives bill.

TORQUAY: Proclamation issued.

DEFENSE ACT: Hearings close.

Social Security

A bill prepared by the State Employment Security Administrators has been introduced by Representative Mills (Dem., Ark) under the title "Employment Security Administrative Financing Act of 1951." The State Administrators are regarded as the most effective single force in the maintenance of the integrity of State unemployment compensation systems and the preservation of the principle of experience rating. The measure would: (1) provide for an allocation back to the State of any annual excess of tax collection under the Federal Unemployment Tax Act over disbursements for the cost of administration of the Federal and State employment security agencies; (2) create a permanent reinsurance fund to underwrite the solvency of the unemployment trust funds of the States; and (3) apply the provisions of the Federal Unemployment Tax Act to employers having one or more employes at any time in a taxable year.

This measure will be considered by

the Ways and Means subcommittee under Chairman Forand (Dem., R. I.) at hearings which may begin in July. It will be remembered that Representative Forand introduced a number of bills including one which would redefine the term "employe" and would bring about a change in the common-law statute of mine leasers and other independent contractors.

Trade Agreements Authority

Now at the White House awaiting approval is the bill, H. R. 1612, extending the Foreign Trade Agreements Act for two years. The Senate-House conferees approved the Senate Finance Committee amendments discussed in the May JOURNAL and accepted the House provision requiring the withdrawal of tariff concessions on Soviet-dominated countries. The measure includes the "peril point" and "escape clause" amendments designed to give relief to domestic industries which are injured or threatened with injury by excessive imports.

Torquay Agreement

On June 4 the President issued a proclamation making effective on June 6 some 700 tariff concessions granted at Torquay, England, through trade agreements with Belgium, the Netherlands, Canada, France, Luxembourg, and the Dominican Republic. By "most favored nation treatment" these concessions are extended to all nations not discriminating against the United States.

The agreement includes tariff reductions on lead in ores and concentrates, flue dust, etc., from one and one-half cents per pound to three-quarters cents per pound; on lead bullion, pigs, bars, scrap, Babbitt metal, solder, and alloys and combinations of lead, from 2⅛¢ per pound to 1 1/16¢ per pound; on zinc in ores and concentrates, from ¾¢ per pound to 3/5¢ per pound; on zinc in blocks, pigs, slabs and zinc dust, from ⅞¢ per pound to 7/10¢ per pound; on aluminum metal and alloys, from 2¢ per pound to 1½¢ per pound. These reductions, made in the agreement with Canada (and also Peru for lead and zinc), became effective June 6.

Other concessions, with the rate in effect on January 1, 1951, shown in parentheses (the country to whom the concession was made is also shown, though in each case the concessions are "generalized" and made available to practically all other countries): barytes ore ($3.50 per ton) $3. per ton—Canada; lampblack (20 percent ad valorem) 10 percent—Germany; bentonite, unwrought and unmanufactured (75¢ per ton) 37½¢ per ton—Canada; litharge (2¼¢ per lb) 1¼¢—Canada; white lead (2 1/10¢ per lb) 1 1/20¢ per lb—Canada; clay and earths, unwrought and unmanufactured ($1 per ton) $.50 per ton—Germany; bentonite, wrought or manufactured ($1.625 per ton) 81¼¢ per ton—Canada; crude feldspar (25¢ per ton) 12½¢ per ton—Canada; fluorspar containing over 97 percent of calcium fluoride ($5.60 per ton) $2.10 per ton—Canada; mica, ground or pulverized (15 percent ad valorem) 12 percent—Canada; talc, steatite, or soapstone valued at not over $14 per ton (10 percent ad valorem) 8¾ percent—Canada; ferromanganese containing not less than 4 percent carbon (11/16¢ per lb) ⅝¢ per lb—Canada; chrome or chromium metals (25 percent ad valorem) 12½ percent—Norway; titanium (25 percent ad valorem) 20 percent—Canada; barium, boron, strontium thorium, and vanadium (25 percent ad valorem) 12½ percent—Canada; bismuth (3¾ percent ad valorem) 1⅞ percent—Canada.

Bound on the free list were chrome ore or chromite (Turkey), composition metal (Benelux), emery ore (Turkey), limestone (Canada), and vanadium ore and concentrates (Peru).

Mining machinery and parts were reduced from 15 percent to 13¾ percent ad valorem as result of concessions granted to Canada.

On May 22 the President approved the bill suspending the import tax on copper from April 1, 1951, until February 15, 1953, or until the end of the present national emergency, whichever is earlier. This law requires the U. S. Tariff Commission to notify the President within 15 days after the end of any month in which the domestic price of copper falls below 24¢ per lb delivered Connecticut Valley. Within 20 days after receiving such notice the President is required to reimpose the 2¢ a lb import tax

Meanwhile American custom smelters of copper are meeting with officials of the Office of Price Stabilization to discuss the U. S.-Chilean agreement increasing the price of Chilean copper by 3¢ a lb. The smelting companies under ceiling price regulations cannot sell their refined output at more than 24½¢ per lb, whereas the New York quotation for foreign copper is 27½¢ per lb as a result of the Chilean agreement.

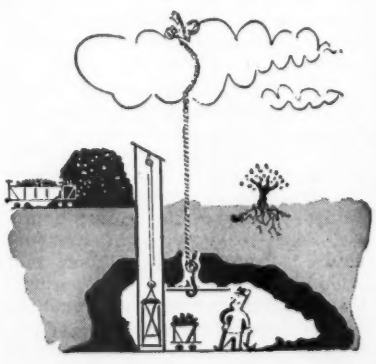
Defense Act Extension

The Senate and House Banking Committees have concluded hearings on the bill which would amend and extend the Defense Production Act of 1950. In addition to testimony by numerous Administration officials in support of the measure, farm organization and industry leaders have declared strongly for dropping wage and price controls and for substituting a program to increase production, end non-essential Government spending, restrain credit further, encourage private saving, increase the sale of Government bonds, and levy higher taxes. The testimony of labor leaders has been for stronger controls and has included charges that industry representatives are seeking to kill the wage-price control program.

Interior Secretary Oscar Chapman urged the Committee to grant the Government power to bear temporary increases in costs of production, distribution or transportation that threaten to impair maximum production or supply of materials in any area. "In the minerals field," said Chapman, "we must rely more and more on high-cost sources for our supplies. If we rely simply on the pull of rising prices to obtain such supplies, we shall wreck stabilization. What we need above all is an effective means by which we can protect our price structure and at the same time bring out that portion of high-cost domestic production needed to fill the gap between supplies of critical materials otherwise available and our essential requirements for them."

Secretary Julian D. Conover of the American Mining Congress urged both Senate and House Committees, in connection with any subsidy program that may be found necessary to bring out increased production of metals and minerals, to apply such subsidies on a uniform basis to all new or increased domestic production above that for a specified base period such as 1946-1949. This position is supported by a resolution recently adopted at a meeting of the National Minerals Advisory Council.

As matters now stand, it seems that the Banking and Currency Committees will find it necessary to report a joint resolution to their respective Houses extending the current Defense Production Act for a considerable period beyond the expiration date of June 30.



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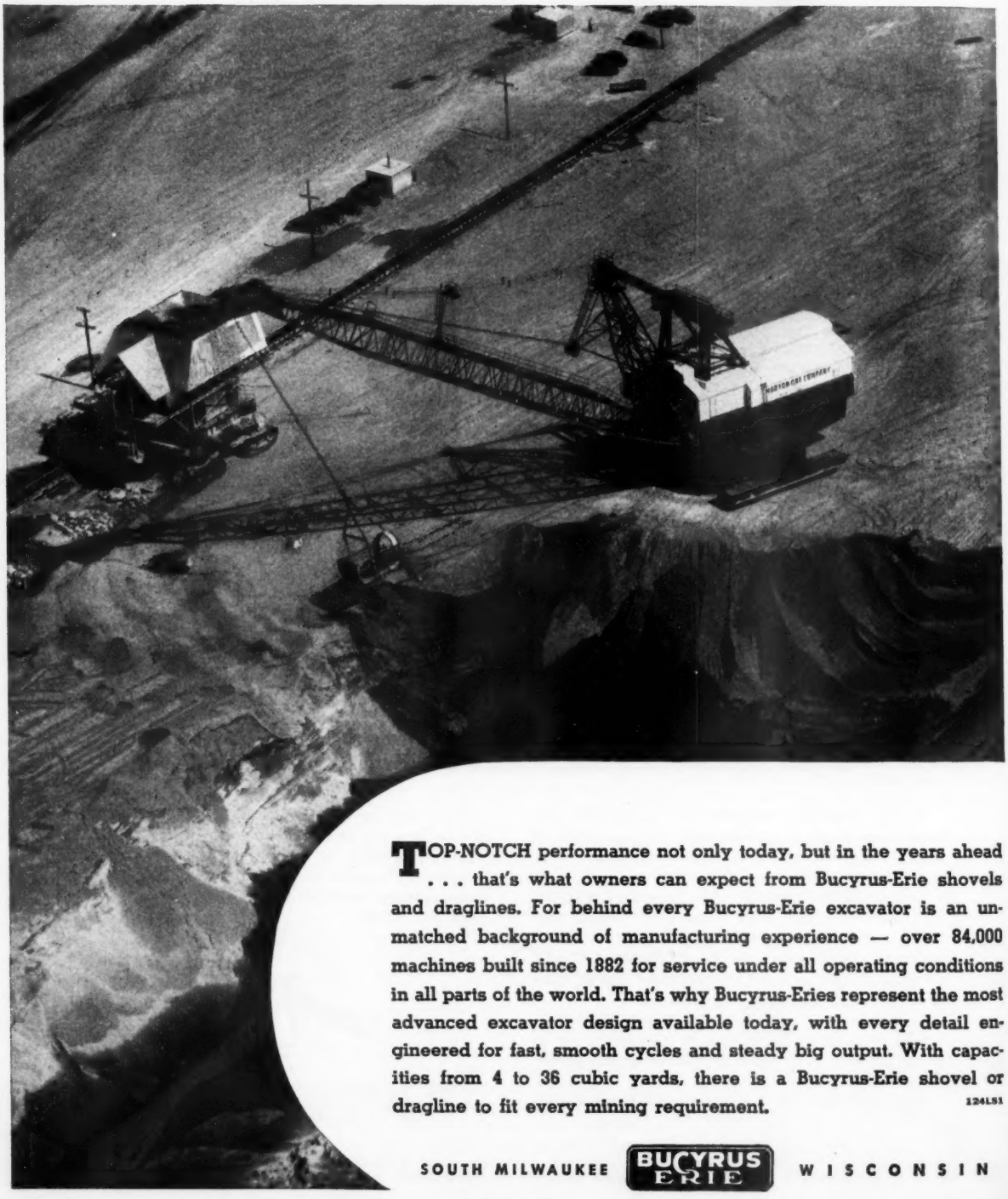

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AMC Personals

H. E. Mauck, general superintendent, Olga Coal Co., Coalwood, W. Va., recently announced two changes in his company's organization. **M. H. Hall**, chief engineer, resigned to take the position of superintendent of construction where he will be in charge of sinking a new shaft as one of his first duties, **D. C. Ridenour**, mining engineer, was promoted to chief engineer, replacing Hall. Ridenour has been with the company since 1949.

R. K. Gottshall was elected a vice-president of Atlas Powder Co. at a meeting of the board of directors on May 2. Gottshall started with Atlas as an explosives plant chemist in 1927. He became director of explosives sales in 1943 and assistant general manager of the explosives department in 1948. His most recent assignment has been as assistant to the president.

Frank Eichelberger, Spokane mining engineer and one time manager of the Sunshine silver bonanza, has been engaged by the Gibbonsville Mining and Exploration Co. to operate its zinc-lead-silver tailing deposit, the Brown Placers, near Smeltersville, Ida.

Benjamin F. Fairless, president of the United States Steel Co., was recently awarded the Bessemer Medal for 1951 by the British Iron and Steel Institute. The presentation was made in behalf of the Institute by Sir Charles Goodeve, director of the British Iron and Steel Research Association, at the fifty-ninth general meeting of the American Iron and Steel Institute held at the Waldorf Astoria Hotel.

L. F. Reinartz who has been an assistant vice-president of the Armco Steel Corp., in charge of the company's Middletown division and of its coal mine operations, has been elected a vice-president of the company. In his new post he is in charge of special operating developments for Armco and its affiliated companies, and will remain in charge of mining operations. **G. D. Trotter** was named manager of the Middletown division; **D. S. Holstein**, general superintendent in charge of rolling and processing at the Middletown division; and **O. E. Clark**, general superintendent in charge of blast furnaces.

Roger I. C. Manning, of Phoenix, Ariz., has recently been chosen director of the State Department of Mineral Resources. A native of Maryland, Manning has been connected with the Department of Mineral Resources since April 1, 1946, as field engineer. **Charles H. Dunning**, director since May 15, 1944, is resigning July 1 to engage in the private practice of mining engineering.

John F. Burns, chairman of the board of Empire-Hanna Coal Co., Ltd., Toronto, Canada, announced that **John R. Frith**, president, resigned to take an executive position at Hanna Coal & Ore Corp., Cleveland. Frith is continuing as a director of Empire-Hanna. He is succeeded as president by **K. C. Culham**, who also becomes a director of Empire-Hanna, along with **James V. Sherwin** of Hanna Coal & Ore Corp. Burns also announced **J. F. Brooke's** and **George R. Cooper's** election as vice-presidents of Empire-Hanna.

Edward G. Fox has been elected president of the Philadelphia and Reading Coal and Iron Co. This advancement followed close on the heels of his recent promotion to the post of executive vice-president of the company. His first position in the anthracite industry was with P&R in 1921.

John Evans of Phoenix, Ariz., has been elected president of the Comstock Extension Mining Co., operating between Globe and Miami. The company recently completed development at the Irene and Doughboy properties.

H. C. Rose, president of the Pittsburgh Coal Co., recently announced **J. S. Whittaker's** appointment as director of safety, replacing **R. H. Nicholas**, who retired April 30, 1951. Whittaker is a graduate of the Colorado School of Mines and has been with Pittsburgh Coal since 1939.

At the 23rd Annual Meeting of the Lead Industries Association held in New York recently, Felix E. Wormser was reelected president, J. A. Martino and K. C. Brownwell, vice-presidents.

George W. Wunder, plant manager of National Lead Co.'s MacIntyre Development since 1949, has been named plant manager of the Atomic Energy Commission's Feed Materials Production Center planned for construction near Cincinnati. National Lead Co. is contract-operator of the plant which will include a uranium ore refinery and other facilities for the production of uranium in forms suitable for use at the Commission's issionable materials production plants. Production superintendent of the plant will be **David J. Blythe**, general superintendent of the company's Perth Amboy plant since 1948.

G. W. Wunder

Dr. Charles H. Bowie, Jr., and Park A. Hodges of the firm of Behre, Dolbear & Co. are in Haiti where they are engaged in professional work for the Government of that country.

Charles R. Ince and **Rene J. Mechin** have been elected vice-presidents of the St. Joseph Lead Co. it was announced recently. Ince, a graduate of Columbia University, joined the company as assistant sales manager in 1929. He was promoted to metal sales manager in 1948.

R. J. Mechin

Mechin was graduated from the Colorado School of Mines and entered the engineering department in 1925. In 1926 he was transferred to Edwards, N. Y., as division manager of the Balmat-Edwards properties. Since 1949 he has been employed in the New York office of the company.

Donald G. Welsh's appointment as chief counsel of the Bureau of Mines was recently announced by the Secretary of the Interior. Welsh replaces **John L. Hofflund**, just appointed counsel of the Defense Minerals Administration.

Anthony N. Bennett of Glendale, Ariz., has been appointed state mine dust engineer. He succeeds **Howard L. Hartman** who is at the University of Minnesota working toward his doctorate.

Appointment of **Stanley D. Michaelson** to the newly-created position of chief engineer, raw materials division of Tennessee Coal, Iron and Railroad Co., has been made. First employed in 1947 by T. C. & I. as special engineer, Michaelson more recently was chief engineer at their coal mines.

According to a recent announcement, Jeffrey Mfg. Co. has elected its first new president in 21 years. **J. H. Fulford**, former vice-president, was chosen to fill the position vacated by **R. W. Gillispie**, who was elected to chairman of the board of directors. **R. H. Jeffrey**, son of the founder, was named chairman of the executive committee and **J. E. M. Wilson**, formerly district manager of the Pittsburgh office, replaces Fulford as vice-president and manager of the Mining Division.

J. H. Fulford

At the annual meeting of the board of directors, held May 21, **Russell B. Caples** was elected president of the American Zine Institute. Caples, who is manager of the Anaconda Copper Mining Co.'s operations at Great Falls, Mont., succeeds **Edward H. Snyder** who held the office since 1949.

J. Trevor Thomas, business manager of the School of Mines and Technology at Rapid City, S. D., since 1947, has resigned to take a position as consultant in the civilian education requirements program, U. S. Office of Education, at Washington, D. C.

M. Albert Evans and **M. L. Workman** recently resigned from their positions with Eastern Gas and Fuel Associates. Both men will take over active management of other coal mining companies.

Evans with Eastern Gas and Fuel for 25 years, was supervisor of mining operations at 22 mines in West Virginia, Pennsylvania and Kentucky. He has interests in the Cliff Coal Co., Bluefield, W. Va., and in the Pine Township Coal Co., Inc., Heilwood, Pa., and the Rhems Coal Co., Youngwood, Pa.

Workman, with the company for 25 years, was manager of the low volatile division, which includes mines in Raleigh and McDowell counties. He will replace his father, Everett C. Workman, who is retiring, as head of the Workman Coal Co., Peytona, W. Va. He will also take over the active management of the Bluefield Pocahontas Coal Sales Co., Bluefield, W. Va.

Sall Named Assistant to Editor of Mining Congress Journal

A new member has joined the staff of Mining Congress Journal. George W. Sall was recently named assistant to the editor.

Mr. Sall brings with him a practical knowledge of production and engineering in the mines of Pennsylvania and West Virginia. He worked as a field engineer for the U. S. Coal and Coke Co. at Gary, W. Va. and with the Pittsburgh Coal Co., Library, Pa., as draftsman, as a member of the engineer corps, and as a miner. His experience has been in deep and strip mining, in both coal and other minerals.

During World War II, Sall served as a demolition specialist with an engineer combat battalion, and saw duty in the U. S. and European Theaters. After discharge from the Army he completed his studies at Ohio State University and graduated with a degree in Mine Engineering.

Harry J. Wolfe, mining and consulting engineer of New York, has been engaged during the past few months in examining manganese, tungsten, uranium, and sulphur properties in some of the western states including Arizona, Colorado, Utah and Wyoming.

—*Obituaries*—

C. C. Hagenbuch, engineering assistant to the vice-president, Hanna Coal Co., died at his home in St. Clairsville, Ohio, on May 3, following a brief illness, Mr. Hagenbuch had a long experience as a coal mining engineer and and was among those who took an active part in the development of mechanization. As chairman of the American Mining Congress Committee on Haulageroads he contributed much to the modernizing of underground transportation.

George B. Stoess, 38, and **Vincent L. Daulton**, 47, respectively assistant sales manager, wire rope division and Philadelphia district sales manager, John A. Roebling's Sons Co., were killed in a train wreck at Bryn Mawr, Pa., on May 18 while returning from the Coal Show in Cleveland.

Joseph Pursglove, Sr., 73, head of the Pursglove Sales Co., Cleveland, died recently. At the time of his death he was living in Cleveland. Mr. Pursglove, who was born in England and came to this country in 1881, was long one of the leading producers of bituminous coal in West Virginia and Pennsylvania.

Franklin W. Olin, 91, died May 21 in St. Louis. He was founder of the Olin enterprises which make up Olin Industries Inc. He began his business career as a builder of blasting powder mills, and in 1892 established his own firm in East Alton, Ill., for the manufacturing of black powder.

James L. Leonard, 42, prominent mining engineer of Spokane, and past president of the Northwest Mining Association, died of injuries suffered in an automobile accident. President of the Metaline Mining & Leasing Co., he was also vice-president of Leonard, Matthews, and Ryan, Inc., mining, mortgage and realty firm of Spokane, and was a director of the Grandview Mines. He had operated several mines in Idaho and Montana.

Thomas J. O'Brien, 55, general counsel of the Defense Solid Fuels Administration, died recently of a heart attack. He came to Washington from Omaha, Neb., in 1937. While in Washington he was a member of the legal staff of the National Bituminous Coal Commission which was later absorbed by the Department of the Interior. He served as general counsel for the Solid Fuels Administration during World War II and recently was transferred to the Defense Solid Fuels Administration from the Bureau of Reclamation.

Anthracite Publicity

Edward H. Walker, vice-president in charge of public relations for the Anthracite Institute, recently announced a new network television program, "The Better Home Show," to be sponsored by the Institute. The program is designed to reach consumer and potential consumers with automatic anthracite equipment demonstrations, thereby promoting anthracite sales. Results of the television show are already developing, Mr. Walker asserts.

Open Pit Meeting

The 1951 Annual Meeting of the Open Pit Mining Association, Electrical Division, will be held at the University of Illinois, Urbana, Ill., on July 27. An inspection of the Electrical Laboratory at the University of Illinois and presentation of four papers are on the program for the one-day meeting. Guy Shorthouse, of the United Electrical Coal Cos., will be in charge of the meeting.

New Coal Scholarships

Two annual scholarships covering an entire college course, one at Butler University, Indianapolis, the other at Purdue University, Lafayette, Ind., were recently established by the Enos Coal Mining Co. The scholarships, worth $700 at Butler and $500 at Purdue, are to be known as the George A. Enos Memorial Scholarships in honor of the company's founder, the late George A. Enos.

All boys attending high schools in Knox, Pike, Warrick, Gibson and Daviess Counties in southern Indiana are eligible. As a further requirement, aspirants must be in the upper-third of their class scholastically.

New Laboratory

Demands for research in behalf of the nation's defense effort have prompted the Battelle Memorial Institute, Columbus, Ohio, to construct a new $1,000,000 laboratory. The construction has been approved by the National Production Authority as a result of endorsement by military and other government agencies. Construction has already begun on the new building which is expected to allow a 15-20 percent increase in Battelle research services.

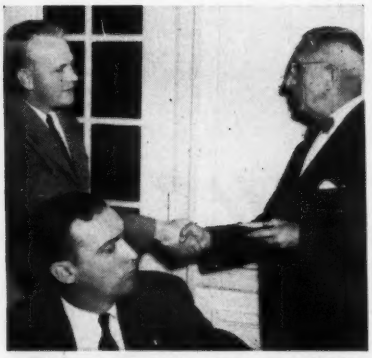
To Improve Lake Ore Docks

In a recent announcement the Baltimore & Ohio and New York Central Railroads announced that they will undertake a major expansion of ore handling facilities at their jointly-owned Great Lakes coal and ore docks at Toledo, Ohio.

Located on Maumee Bay just off Lake Erie, the docks will be improved to provide additional capacity and even faster unloading for ore moving to expanding midwestern steel mills. The present ore loading machines will be remodeled to provide increased capacity in time for the 1952 lake shipping season and two new loaders are being ordered for installation before the beginning of the 1953 shipping season. Even after the new units are placed in service it is planned to keep the improved present machines in operation. The railroads pointed out that the improvement is being undertaken in coordination with increase in steel mill capacity in response to the national emergency. About 1,150,000 tons of ore have been handled annually at these docks since they were placed in operation three years ago. Coal also is handled at the facility, but in much larger tonnages.

Ceremonies, highlighted by an address by Governor Theodore R. McKeldin of Maryland, marked the opening of the new ore dock of the Baltimore and Ohio Railroad at Baltimore, May 15. The new 650-ft pier is especially constructed to accommodate ocean-going ore-carriers of up to 40,000 tons. The flow of iron, manganese, chrome and other ores from foreign sources began with the unloading of the S.S. Chilore carrying 26,000 tons of Chilean iron ore

Annual Old Timers' Awards



Three mining students were recently honored by an award of the Old Timers' Club. They are, from left to right, Chester James Stull, Jr., Wharton, W. Va., receiving award from E. R. Price, Wheelwright, Ky., general manager of coal properties, Inland Steel Co.; Billy Frazier Eads, Acme, W. Va., being presented the award by S. M. Cassidy, president of the Consolidated Coal Co. (Ky.); and Stoddard S. Burg accepting his award from George H. Deike, secretary of the Old Timers' Club. Stull is a student of Virginia Polytechnic Institute, Eads at the University of Kentucky, and Burg at Pennsylvania State College. The Old Timers' award, a gold watch, is presented annually to outstanding senior students of mine engineering

Mining Advisors

Appointment of Pierce Management, Inc., Scranton, Pa., as mining advisors for a period of three years on the Ptolemais Lignite Project was recently announced by the Kingdom of Greece. The project involves open-pit mining of 3,000,000 tons of lignite, manufacture of 600,000 tons of briquettes yearly, and construction of a 40,000-kw power station. Headquarters have been established in Athens for the necessary Pierce personnel.

Safety Records Honored

Sixty-five of 168 coal mine foremen who have achieved a safety record of four or more years without a lost-time accident to themselves or their men were on hand to receive their honor certificates at a luncheon given in their honor by the National Coal Association at the Hotel Statler, Washington, D. C. This is the second year that such awards have been made by NCA.

Heat From Coal

Figures on home heating were recently released by the Census Bureau as compiled in the 1950 census. The number of coal-heated homes using central-heating systems was reported as 9,430,000. An additional 5,127,000 dwelling units used coal in various types of space heaters. The combined figure for coal-heating in homes with central-heating systems, and space heaters in 1950 was 14,557,000.

There were 11,795,000 units, both central-heating systems and space heaters, using gas as fuel and 9,115,000 units using liquid fuels. Since much of the manufactured gas comes from coal, many of the units using gas are, in reality, dependent on coal for their heating.

To supply the fuel for these 14,557,000 dwelling units, 120,000,000 tons of coal passed through retail coal merchants during 1950. Some of the coal went to schools, churches, hospitals, small commercial and industrial plants and other community services, but the major part was delivered to homes and apartments for heating purposes.

Make Synthesis Gas for Liquid Fuels

Pilot-plant experiments by the U. S. Bureau of Mines on gasifying coal indicate that a newly-developed process might prove suitable for making commercial synthesis gas (carbon monoxide and hydrogen) directly from raw coal, Regional Director H. P. Greenwald of the Bureau reported.

Synthesis gas can be used to produce gasoline, oil, pipeline gas, ammonia, alcohol, and other widely used products.

Tests in gasifying raw coal are being conducted by the Bureau at its Morgantown, W. Va., plant in cooperation with West Virginia University as part of the Bureau's synthetic liquid fuels program. Results of these tests are revealed in a progress report just made public which describes a new gasifier developed for producing synthesis gas from pulverized coal entrained in oxygen and steam.

Greenwald added that the Bureau of Mines recently decided to build a larger gasifier, incorporating many features of the equipment developed at Morgantown. This larger unit is being constructed at the Coal-to-Oil Demonstration Plant at Louisiana, Mo. The report on the pilot-plant work at Morgantown points out that two other coal-gasification methods are the fixed-bed and the fluidized-bed systems. In the fixed-bed system, the

New equipment for the handling of sulfur and bauxite from steamship to distantly located storage areas was recently installed at the Warners Plant, Linden, N. J., of American Cyanamid Co. The equipment—which includes an unloading tower and a new type of boom stacker with auxiliary conveying and distributing equipment—will handle these two materials at the rate of 600 gross tons per hour.

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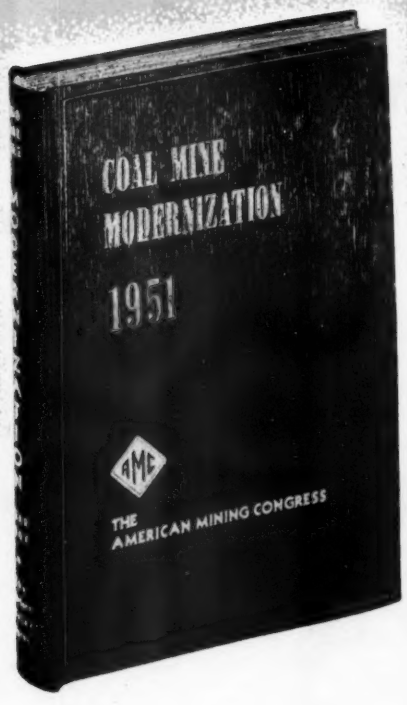

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only one used commercially until recently, relatively expensive coke rather than coal has been employed generally.

Reviewing results of the experiments at Morgantown, the report comments: "In general, the pilot-plant performed very well. Continuous operation was possible, the runs being terminated voluntarily. The percentage gasification of the coal was very satisfactory. The oxygen requirement . . . in the high temperature steam runs was lower than that for any other known continuous process."

Suitable refractory materials also have been found for superheating steam to a high temperature and for use in the generator, the report explains.

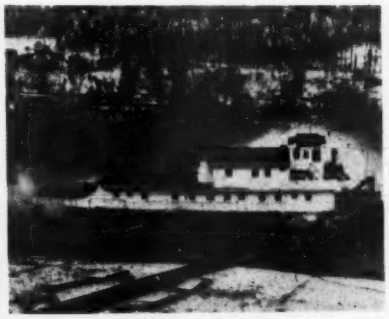
"The type of coal used is not critical, so that it can be purchased on a heat-content basis, and the ratio of hydrogen to carbon monoxide may be adjusted within limits," it continues.

The report, which includes eight tables and more than 50 illustrations, describes the pilot-plant and procedures used at Morgantown. It also discusses results obtained as well as plans for future pilot-plant operations based on data and experience gained thus far.

Report of Investigation 4733, "Pilot-Plant Gasification of Pulverized Coal with Oxygen and Highly Superheated Steam," may be obtained free by writing the Bureau of Mines Publications-Distribution Section, 4800 Forbes St. Pittsburgh 13, Pa.

New Coal Towboats

Eight new towboats, six of which have already been launched, will improve vital river transportation of coal from mines to steel mills and other points in the Pittsburgh industrial area. The 108-ft welded steel craft can develop 25,000 lb thrust.



Their normal tow will be six river barges each loaded with 5400 tons of coal.

Diesel-powered, the eight towboats are given more thrust and maneuverability by the installation of special nozzles, steel rings of airfoil cross-section that encircle the propellers to feed them larger volumes of water. Dravo Corp. of Pittsburgh is building the eight towboats.

To Convert Cargo Vessels

Bids have been requested from East Coast shipyards for the conversion of one or two C-4 type cargo ships to iron ore carriers by the Wisconsin & Michigan Steamship Co. Present plans call for lengthening the 497-ft vessels to 631 ft. Deadweight will be increased from 12,500 tons to about 20,000 tons.

It was stated that the company wishes to have the vessels ready for service on the Great Lakes with the opening of navigation next spring.

Record Broken

Jones & Laughlin Steel Corp.'s Benson mines in the Adirondacks of northern New York state produced over 1,000,000 gross tons of iron ore in 1950. Passing this mark set a new milestone in development of the world's largest open-pit mine for magnetite iron ore.

The record reflected the steady addition of mining and processing equipment during the past seven years since the first year of full production in 1944. It showed progress in mining techniques and processing efficiency.

Ground has already been broken at Benson mines for construction of a new concentrating plant, a new sintering plant, and other improvements. It is expected that this will further increase output by approximately 30 percent by 1952.

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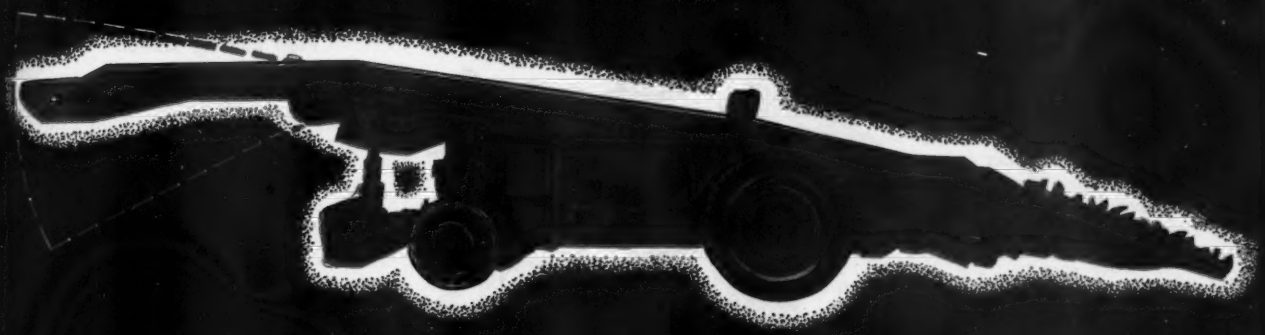

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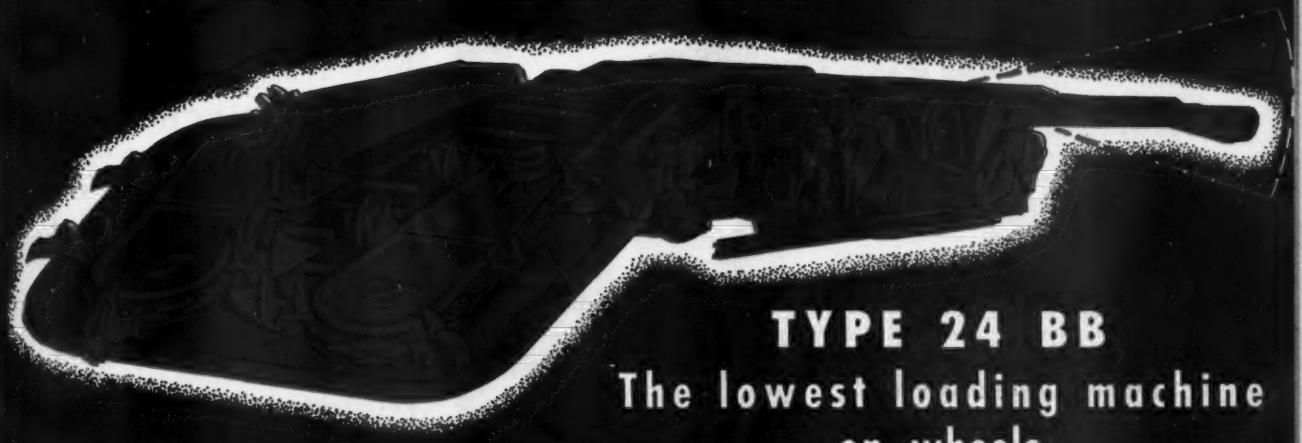

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- Telescopic jack adjustable to any car height — with oversize cylinders for low hydraulic pressure.

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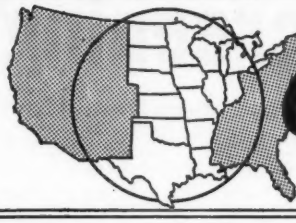
Replace Locks

Construction of a new lock on the Monongahela River at Braddock, Pa., is expected to aid barge movement of coal to steel mills at Pittsburgh. The new lock, now under construction, will be 720 ft long by 110 ft wide. It will replace the present 362-by 56-ft lock. Along with an auxiliary lock, 360 by 56 ft, already constructed, the new "jumbo" lock will replace twin locks constructed in 1904.

A coal tow of six barges and towboat will be able to pass through without double tripping.

Plan Coaling Station

Showing "further evidence of Norfolk & Western Railroad's faith in the efficiency of coal-burning steam locomotives," the railroad has announced plans to build a new coaling station at Bluefield, W. Va. Cost of what will be one of the largest and most complete locomotive coaling stations in the world was estimated at $660,000.



Central States

Rail Shipment Successful

About 1,000,000 tons of iron ore were moved from Minnesota mines to Great Lakes smelters by rail this winter, officials of the U. S. Steel Co. have announced. They termed the first such winter movement successful, but said no plans have been made to move ore by rail next winter.

Until the first experimental shipment of ore left the Oliver Iron Mining Co., Monroe open pit near Chisholm, Minn., last December 27, ore traffic from Minnesota had been exclusively by boat, but this flow is cut off for four months each year by the lake freeze-up.

Lithium in Black Hills

In the Black Hills of South Dakota are the greatest stores of lithium minerals in the world. A report by the natural resources commission of the state said two years ago that the Black Hills had one of the world's largest deposits and that South Dakota is the chief American producer of the element. This makes it very important, if Argentina's recent claims of using lithium to produce atomic reaction is true.

Ten Scholarships Given

Ten $500 scholarships have been awarded five girls and five boys by Allis-Chalmers Manufacturing Co. this year. Winners were chosen after careful examination by a committee of educators and businessmen of qualifications of entries from sons and daughters of company employes. The scholarships are renewable each year if certain qualifications set by the scholarships committee are satisfied. It is possible for each student to receive $2000 in educational assistance while completing four years of college study.

Texas—New Ceramic Center

Sources of sufficient magnitude to make San Antonio a ceramic manufacturing center, as well as to permit development of a sizable mineral processing industry in south Texas, have been reported by Southwest Research Institute.

These facts came to light upon completion of a six-month preliminary survey of the area's ceramic production potentials by the Institute's mineralogy department. Authorized by a city government bureau, the survey was conducted by John Funnell, ceramic engineer and economic geologist.

Among facts uncovered were the existence of substantial quantities of kaolin, plastic clays, talc and feldspar in the immediate San Antonio area.

Record Cargo Carried

A Great Lakes ore carrier, the SS *Wilfred Sykes*, owned by the Inland Steel Co., has set another new record. The vessel carried 19,233 gross tons of iron ore from Superior, Wis., to Indiana Harbor, Ind., in early May. The previous high mark, set last fall by the *Sykes*, was 18,725 gross tons of ore.

Coal Stocks Great

Coal stocks at the Duluth-Superior docks on May 1, 1951 consisted of a total of 2,088,025 tons as compared to a total of 158,279 tons on May 1, 1950, one year earlier. The total present tonnage is made up of 2,011,922 tons of bituminous, 3,028 tons of anthracite sizes and 73,075 tons of anthracite dust.

Protest Contract Awards

A group of North Dakota lignite mining officials were informed about the middle of March that the U. S. Air Force has awarded contracts for installation of bituminous coal burning furnaces in some Federal installations in North Dakota despite the protest of the group. S. W. Monahan, manager of the Miller strip mine at Sawyer, N. D., was quoted as saying that Senator Milton R. Young had informed him contracts had been awarded by the air force.

Among those protesting the bituminous furnace installations were R. E. Schaeffer, president of Baukol-Noonan, Inc., and W. E. Keller, vice-president of the Truax-Traer Coal Co., and Monahan. The group visited Washington in January to urge Federal officials to use lignite in heating of Federal installations in North Dakota.

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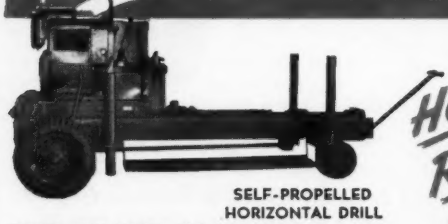

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Good Fishing

Some of the best fishing in the midwest is the result of coal mining. When the pits left behind after coal stripping lie below the water table of the surrounding region, they become lakes soon after mining operations cease. Forward looking coal companies have in many cases stocked these lakes with fish and planted evergreen trees on the surrounding country. The result is a blanket of valuable evergreen forest and lakes well stocked with fish.

In the State of Indiana the state Coal Producers Association has thus created 45,000 acres of forest, with 4500 acres of fine fishing lakes. In one county alone the coal operators have donated 3900 acres as a state forest, dotted with 350 acres of well-stocked anglers' paradises.

Start New Heavy Density Unit

Foundations of a heavy density ore processing plant to treat fine iron ore at the Holman mine, Taconite, Minn., have been poured by the Holman-Cliffs Mining Co. The new H-D plant unit is being built adjacent to the present ore processing plant at this location.

Potter-Sims Expand

Upon the retirement of Mike Evans, independent Tri-State mine operator, Potter and Sims took over his holdings in Jasper County, which include a tract of land about one half mile south of Alba, and the Sucker Flat open-pit mining tract of 120 acres adjoining Webb City on the south. The large mill is being remodeled, and a flotation circuit added.

The Alba tract contains 40 acres on which has been developed an ore body 240 ft deep, the upper part being suitable for open-pit work. It has about 40 ft of overburden with a rich, soft ore body underneath. It is planned to truck this ore to the Sucker Flat mill for cleaning.

On the south side of Sucker Flat there is a deposit of hard rock ore which was worked years ago and supplied several mills. There are some shafts in ore on this portion of the tract. A drilling campaign is planned to prospect for both shallow and deep ore.

When Evans was mining this tract nearby residents who objected to the dust, noise of the mill, and open air blasting, brought suit. They lost their case, but recently complaints were made to the Webb City Council to pass an ordinance prohibiting mining on the tract. This was refused but a licensing law was passed requiring mining companies to pay $1500 a year for the privilege of mining or milling within the city limits.

To Pay Iron Ore Royalty

The North Range Mining Co. will pay the first royalty ever received by the State of Michigan for iron ore taken from state-owned and leased land. The mining company, which started new exploration in the old abandoned Warner mine near Amasa, Mich., in 1944, reported that 3186 tons of iron ore were mined in the first quarter of 1951. A royalty of seven percent of the ore value will be paid the state when the ore is shipped.

To Expand Phosphate Plant

Due to increased demand, Victor Chemical Works has announced plans to more than double the expansion program announced last summer. The announcement was made by August Kochs, chairman of the board, at the annual stockholders meeting in Chicago, Ill. The increasing demand for the company's products necessitates the expansion. Principal expansion will take place at the company's Silver Bow plant near Butte, Mont. Phosphate plants at Chicago Heights, Ill.; Nashville, Tenn.; Morrisville, Pa.; and South Gate, Calif., are to be expanded to handle the additional phosphate production of the furnace plant at Silver Bow.

A second furnace is to be constructed at Silver Bow, with the first to be in production this year, producing elemental phosphorous from extensive phosphate rock deposits in Montana. The machine shop, storeroom, storage silos, offices and the change house are practically complete. Steel for the furnace is now being raised or is on the ground.

At the Maiden Rock phosphate mine, which is to supply the Sliver Bow plant with raw material, some 45 men are now employed in mining operations. A drift has been driven 2200 ft, one raise is nearly ready for holing and another well along. Stoping operations soon will be started. Phosphate ore taken from the mine in the drifting and raising operations has been stockpiled at the mine for future shipment to the Silver Bow plant.

Tax Aid Given

Mining companies have been assured tax assistance during development of low-grade Michigan iron ores by the signing of a legislative measure by Governor G. Mennen Williams. The bill fixes tax assessments on such properties at an amount not exceeding the average annual production multiplied by two percent of ore value.

Lightening the tax load will encourage development of Michigan's low grade iron ore. In the Uppen Peninsula are millions of tons of low grade ore but development costs are higher than those in the richer ores.

St. Joe to Expand

In compliance with desire of Defense Minerals Administration the St. Joseph Lead Co. hopes to complete in th enext three years the $15,000,000 expansion program originally planned for the 1950-1960 decade.

The program as outlined by Andrew Fletcher, president, includes: opening a new lead-zinc mine in Washington County, Mo., on a 2000 tons per day

basis; the mill at Hayden Creek is to be equipped with a 2000 tons per day sink-float plant; the Federal mill is to be modernized and new underground equipment is to be purchased. Provision is being made to increase the capacity of the Herculaneum, Mo., lead smelter from 65,000 to 100,000 tons per year.

At the Edwards-Balmat properties in New York State plans call for a 50 percent increase in zinc production capacity by the end of 1952.

At the Josephtown, Pa., electrothermic zinc smelter there will be erected another electric furnace and secondary zinc treatment plant.

New Iron Mine Planned

Plans to open a new strip operation, to be named the Carlz mine, located east of Keewatin, Minn., on the Mesabi iron range, have been announced by the Hanna Coal and Ore Corp. Construction of a shop building is under way and operations will start in the near future. The Carlz mine is named in honor of the late Carl Zapffe of Brainerd, Minn., geologist and former manager of the iron ore properties of the Northern Pacific Railway.

Tax Unconstitutional

Recently the North Dakota Supreme Court declared unconstitutional a privilege tax on mineral rights reserved by the owner when he sells the land. The decision left the state with no tax on reserved mineral rights as it is entering what may prove to be an oil boom.

A Morton County district court was upheld by the Supreme Court decision in favor of the Northwest Improvement Co. of Delaware. The tax in question was three percent per acre on undeveloped mineral rights severed from the land and kept by the owner when the land was sold.

The court held the law did not apply to mineral rights which were sold outright and therefore was discriminatory.

Study Arkansas Minerals

Authorization of $35,000 for further studies of mineral deposits in Arkansas has been made by the Arkansas Economic Council-State Chamber of Commerce and the Associated Industries of Arkansas in cooperation with the University of Arkansas.

Washing Plant Moved

The Douglas Mining Co., (Hanna) Chisholm, Minn., has moved its Douglas washing plant to a new site on the Douglas mine property. Iron ore will be crushed, screened and elevated from the pit on a belt conveyor to the cleaning plant under the new arrangement.

Drainage Project

A project to drain the ground from Oronogo through the old camps of Carterville, Webb City and Porto Rico to Duenweg with Federal aid has been proposed and is being investigated by the Joplin, Mo. office of DMA. Dr. David Gallagher of that office made a trip to Washington in behalf of the project. It is said that the proposal has the support of Otto Herres, chairman of the lead-zinc division, DMA, and Dr. James Boyd, national director USBM, provided suitable arrangements to handle the project can be worked out.

The area under consideration is about two miles wide and seven miles long and includes the famous Center Creek Valley between Webb City and Carterville. This was the scene of earliest mining in the area and produced millions of tons of zinc and lead ores. USBM has estimated that there still remain some 12,000,000 rock tons of milling ore. Completion of the project would bring intense mining activity back to the Joplin area for the first time in about 35 years.

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Penn Mine Producing

Equipped with a selective flotation plant the Penn mine near Campo Seco, Calif., is producing 60 tons of copper-zinc ore daily, and the management is reported planning to enlarge the mill and materially expand operations. Construction of the flotation plant and a pilot mill was completed at the property in 1949 after No. 3 shaft had been unwatered and rehabilitated to the 700-ft level. Substantial deposits carrying copper, lead, gold, silver and zinc are understood to be exposed on the 500-ft level and in adjacent areas, with zinc predominating in much of the ore mined.

Mining Regulations

New regulations to protect land surface and prevent water pollution by operators mining coal on public lands in Montana, were announced by the Billings region, Bureau of Land Management. The new lease form binds the operator to take steps to prevent soil erosion, damage to timber, forage, water pollution, and damage to crops and range. Operators may be obliged to fill all excavations and remove or cover all debris at termination of the lease. The amended regulations also provide for a limitation on over-riding royalties. It is believed this will help assure continued production of coal if costs increase beyond the present ratio to royalties and make mining unprofitable.

Climax Maps Expansion

Climax Molybdenum Co. this year will launch an expansion program to meet heavy demands for the important alloying element used to harden steel. The company's mills at Climax, Colo., produce 42 percent of the United States' output of molybdenum. Federal government contracts call for capacity operations for at least five years. Major expansion projects in the program are:

(1) An extension to the by-products plant.

(2) An addition to the primary mill.

(3) Construction of a primary crushing plant.

(4) A large development program for the production of ore from a new level.

(5) A larger and stronger water line.

In addition to expanding the by-products plant, Climax officials said an effort will be made to obtain better recovery of tungsten, pyrite, tin concentrates, monazite, and topaz, obtained through treatment of rough mill tailings.

The planned addition to the primary mill will increase its capacity to 20,000 tons a day. It probably will be mid-summer of 1952 before this addition is ready for operation.

Lander Hill Test Planned

Arrangements have been completed by Round Mountain Gold Dredging Co. for deep diamond drilling of Lander Hill near Austin, Nev. The area to be tested covers about 1000 acres in the heart of the Austin mining district, embracing most of the mines on the hill, operated from 1860-1880. Nevada Equity Mining Co. will collaborate in the drilling program. This company has previously done considerable exploratory work on Lander Hill, including diamond drilling, and developed platinum bearing silver deposits.

Purchase Fluorspar Mine

J. R. Simplot & Co., operators of phosphate deposits in south central Idaho, have purchased the Fluorspar mine at Myers Cove, on Camas Creek, in Custer County and expect to employ about 30 men in fulfilling a two-year contract for fluorspar. The property is equipped with a milling plant.

Copper-Zinc Ore Produced

The Coronado Copper and Zinc Co., Dragoon, Ariz., is producing over 5500 tons of copper-zinc ore monthly from its Republic mine. Both the Johnson shaft, 1600 ft deep, and the recently completed Moore shaft, 580 ft deep are active. The ore is concentrated at the company's mill. Copper concentrates are smelted at the International Smelter, Miami, Ariz., and zinc concentrates at Bartlesville, Okla. Fred E. Gray is manager.

Lone Star Mine Bought

The Rich Creek Fluorspar Corp., of Elizabethtown, Ill., has announced the purchase of the Lone Star mine in Arizona from the Fluorspar Producers Corp., of Los Angeles. The mine is located in the Whetstone Mountains, 15 miles southwest of Benson, Ariz., and has been the state's leading fluorspar producer.

Lone Star was acquired by Cooper Shapley, Jr., in 1946 from the discoverers, M. W. Frye and William Green of St. David. He retained ownership until July 1950, at which time it was purchased by the Pepperdine Foundation of Los Angeles. Six months ago Fepperdine sold to Fluorspar Producers Corp.

Production from the Lone Star was started in September 1946, and has amounted to as high as five cars per month. In 1950 production dropped when all hands were deepening the shaft an additional 50 ft to the 200 level. It is reported that the new owners plan expansion, including further deepening of the shaft, construction of a new ore bin, and a diamond drilling program.

Build Fluorspar Mill

H. W. Gould & Co. of San Francisco is preparing to build a mill between the Broken Hills district, some 35 miles southeast of Fallon, Nev., and Gabbs Valley to process fluorspar from the Baxter mine. The plant will be capable of treating 250 tons of ore daily. Concentrates will be trucked to Luning for shipment by rail to steel mills.

Uranium Find Confirmed

Discovery of uranium in the Bishop, Calif., area has been confirmed by officials of Natural Resources Development Co., a mining corporation in San Jose. LeRoy H. Halverson, vice-president, states the "sizable" uranium ore deposit was located by company engineers. Preliminary assays have shown ore to be above commercial grade and mining conditions are favorable.

To Ship Phosphate

Sunlight Mining Co., which recently took over the former Moonlight property near Maxville, Mont., has contracted for delivery of 20,000 tons of phosphate rock from the northern part of its holdings. The company also has submitted to one inquirer a price on 100,000 tons of rock. Delivery of the first 20,000 tons will start July 1. A force of 15-20 men started to work shortly after May 15 to prepare the deposit for production.

Prince Consolidated Leased

Combined Metals Reduction Co., of Salt Lake City, has obtained a lease on properties of the Prince Consolidated Mining Co. in the Ely and Highland districts, Lincoln County, Nev. E. H. Snyder, president of Combined Metals, said the deal called for approximately 4000 ft of drifting and crosscutting in exploration for lead ores in the Prince property. The exploration will start from Combined Metals mines adjacent to the Prince property. Prince has 12 patented and 12 unpatented mining claims in addition to about 1000 acres of patented ground in Lincoln County.

Deepest Coeur d'Alene Mine

Sunshine Mining Co., Kellogg, Idaho, is sinking its main shaft from the 3700-ft level to 4000 ft, which will give it a depth 1300 ft below sea level making it the deepest mine in the Coeur d'Alene district. The company has recently opened its Silver Syndicate vein system on the 3850-ft level, where the vein shows a strong deposit of silver-lead ore. This is considered one of the largest lead ore developments in the United States in recent years.

Reopen Tungsten Mine

Alpine Mining Co. has started operation of its mill in the Pinenut range near Minden, Nev., on tungsten ore and will reopen its property in Alpine County, Calif., as soon as possible. The company controls several scheelite properties.

Uranium Mine Ships

The sixth shipment of uranium ore has been forwarded to an unrevealed destination from the Free Enterprise property near Boulder, Mont. The 60-ton shipment contained a little primary pitchblende, as well as autunite and metatorbernite. Five men are working at the property, owned by the Elkhorn Mining Co. This is said to be the only mine in the U. S. shipping ore with pitchblende content.

Mine Fluorspar

Ford T. Frost of Ogden, Utah, is preparing to ship fluorspar to the Geneva, Utah, plant of the Geneva Steel Co. from the Needle Point property, 50 miles southeast of Battle Mountain, Nev. The mine is credited with an extensive deposit of high quality fluorspar accompanied by large amounts of low-grade material. Frost recently installed stripping machinery and is reported testing low grade iron ore for possible concentration.

To Develop Paymaster

Spokane-Idaho Mining Co. has taken an operating contract on the Paymaster zinc-lead mine in Blaine County, Idaho, just west of Craters of the Moon. This is the company's first venture outside the Coeur d'Alene district where they operate the Constitution mine in the Pine Creek district.

First work will be to extend a 1400-ft crosscut tunnel about 500 ft, to intersect the Paymaster vein 350 ft below the upper tunnel. About 1000 ft of drifting will be done on the vein, which was followed for some 1250 ft on the upper level.

* Pay Dirt in California *

Plans Shaping Up For 1951 Metal and Nonmetallic Mineral Mining Convention

WITH a poke full of sample suggestions the State Chairmen of the Program Committee will meet in Los Angeles early in July to develop plans for the 1951 Metal and Nonmetallic Mineral Mining Convention, to be held at the Biltmore Hotel in Los Angeles October 22-24. When the samples are dumped out on the table, each will be carefully assayed to determine which hold the greatest value for mining men. Only those assaying high in the answers to general industry problems, government relations or the defense program as it relates to mining will be considered worthy of exploitation at the general Convention Sessions. Suggestions will likewise have to show lots of color in the pan to be considered for the sessions devoted to operating problems, including mechanization in open pit and underground mining, advances in ore treatment, safety, exploration and development, etc. The cream of the prospects will be included in the final program, which will be of wide interest to small and large operators, executives and production men alike.

Over-all plans for this outstanding meeting are rapidly taking shape under the general direction of Harvey S. Mudd, Chairman of the Western Division of the American Mining Congress and Ross D. Leisk of Idaho, National Chairman of the Program Committee.

Following the meeting there will be a number of interesting trips to important mining operations and an opportunity to see some of the "fabulous" scenic attractions of southern California. World famous Los Angeles offers entertainment spots galore for those attending, in addition to the planned functions for which AMC Conventions are justly noted. Plans are also afoot to provide an entertainment program of unusual interest for the visiting ladies.

Plan now to relax with old and new mining friends between the more serious discussions. Take advantage of late October in southern California. Better make your reservations direct with the hotel of your choice now or summer will have come and gone. October is closer than you think.

To Work Tungsten Mine

Operation of the Strawberry tungsten mine near the southern end of Yosemite National Park on a capacity basis is scheduled soon by David W. Baker, Bishop, Calif., and Reno, Nev., mining engineer, and his Fresno associates. A crushing unit has been added to the gravity concentration plant and development work is proceeding underground. Located at 7500 ft altitude, the Strawberry was extensively diamond drilled in 1949 by the USBM. The property was located in 1941 and comprises 11 claims.

Build Asbestos Plant

Preliminary construction has begun on an asbestos plant at Santa Clara, three miles from San Jose, Calif., by the Keasbey & Mattison Co., of Ambler, Pa. Drainage surveys have been completed at the 26-acre site and other preparations made for erection of factory buildings. Most of the asbestos used by American industry is imported from Canada, but deposits have been recently developed in Calaveras, Placer, San Benito, Shasta and other California counties, which it is expected will supply the new plant.

Dredging in Sumpter Valley

Gold dredging in the lower section of Sumpter Valley near Baker, Ore., is scheduled soon by the Powder River Dredging Co. The company controls extensive placer areas tested several years ago and recently bought the bucketline dredge formerly operated near Baker by the Baker Dredging Co. Placers tested are virgin and enough gravel is reported available for a long operating period. The region has produced lode and placer gold and was formerly the scene of much mining activity.

Miners' Day in Butte

Organization of teams to compete in the annual first aid contest, a feature of the Butte Miners' Union Day, in Butte, Mont., June 16, began immediately after the Anaconda Copper Mining Co. announced that the contest would be held. Deadline for entries was April 29.

Twenty teams, five divisions of four teams each, will compete. It will be a class B contest, which means that not more than four experienced first aid contest men will be allowed on any team. The other three team members must be inexperienced in contest work which will involve 10 or more problems. The contest will be under the auspices of the United States Bureau of Mines and its manual will be followed throughout.

Plan Tungsten Mine

An extensive development program for the Westlake Tungsten property, 12 miles south of Globe, Ariz., has been announced by Piggott Projects, of San Francisco. The group of claims, 50 in number, was purchased from Mrs. Brice Westlake of Globe, who had owned them for about 25 years and did the development work. Her primary interest had been in copper and lead, although she shipped a small amount of tungsten ore during World War II.

Piggott Projects, operated by H. B. and F. K. Piggott, is a smelter and refiner of silver, lead and copper ores and concentrates and dealer in scrap metal.

According to H. B. Piggott, veins from six-eight ft wide have been opened so close to the surface that strip mining will be used initially. Present work is confined to testing the extent of the ore body.

Gray Eagle Ships Ore

Shipping grade ore carrying lead, silver, copper, zinc and gold is reported to have been disclosed in new workings of the Gray Eagle mine near Austin, Nev., by recent development. Mining is conducted through the 1700-ft Hovendoen tunnel, and several ore shipments have been made to a Utah smelter. The old mine was reactivated last year by the Gray Eagle Development Co.

Mine Supplies Water

Pumping operations have been started at the old Niggerhead mine to supply water to Walsenburg, Colo. Water has been flowing at the rate of 1000 gpm and as soon as the flow is stabilized it will be diverted into the city system. The mine has been shut down since miners struck an underground flow of water while sinking the shaft 600 ft in search of a coal seam. Although thousands of gallons were pumped each day, the flow could not be halted and the project was abandoned. No actual mining operations were ever conducted off the shaft. The new supply of water is expected to be ample for the present population and any increases in the near future.

Nancy Lee Develops

Miners are drifting on the Nancy Lee ore shoot near Superior, Mont., according to Vice-President L. S. Harrison, of Nancy Lee Mines, Inc. They are now in 90 ft. Two crosscuts being developed within the ore shoot show the minable ore. Some copper has been showing in recent rounds, and ore previously mined under a former leasor contained copper and a small amount of gold. It is thought that the ore now being opened is an extension of that mined above, over a vein length of 450 ft.

A 200-ton mill has been finished at the mine and ore is being stockpiled. Present output is 40 tons per day. Once a stockpile has been built, it is expected that the current faces will deliver enough ore to keep the mill running on a two-shift basis.

The mine was formerly known as the King and Queen and is located at Keystone, Mont.

Grass Valley Gold Find

Idaho-Maryland Mines Corp. has discovered a new gold ore body in an unexplored area that will assure 15-20 years of productive operations, Albert Crase, president, has announced. It consists of six parallel veins dipping through a zone lying between the 2300-ft level and the bottom of the Brunswick mine. Crase expressed the belief that the new area will equal the discovery of 1928, which made the company the second largest gold producer in the country. The company is preparing to develop gold veins at the 2700 level of the Idaho-Maryland mine and the 3200 ft level of its Brunswick property.

With the Defense Agencies

(*Continued from page* 57)

and cover inventories and distributor's sales.

The production agency has also directed a larger share of Special High-grade Zinc, stainless steel, lead, iron and steel, and nickel to defense production.

Mine Serialization

The Defense Minerals Administration has amended its mine serialization order, MO-7, reducing the amount of information required to be supplied by operators who produce or process 50 tons or less of crude ore a week, and extending from June 1 until June 30 the deadline for all mine operators to file for serialization. Small operators are now required to furnish information for serialization purposes covering only the kind of material produced or processed, the location of their operations, the number and types of their employes, and the quantity and kind of products mined or processed during the period 1948-1950 inclusive.

Meanwhile, the Office of International Trade has requested that foreign mines, smelters and mineral processing plants apply for serialization before July 1 or as soon thereafter as possible.

The Defense Solid Fuels Administration has likewise amended the serialization order, extending from May 15 until June 30 the deadline for filing the data required from coal and coke operators so that DSFA may assign serial numbers to the mines and plants under which they may obtain their maintenance, repair and operating supplies.

Fuel Stockpiling

The Defense Solid Fuels Administration is urging Government agencies, industry, and household consumers to "stockpile" coal during this summer to prevent any transportation bottlenecks during the coming winter. DSFA Administrator Charles Connor estimated that close to 580 million tons of coal will be required to meet consumers' needs this year, an increase of 13 percent over 1950 production.

Defense Transport Administrator James Knudson has joined DSFA in urging summer purchasing of coal. He explained the need for such a program by pointing out:

"Defense plants are already stepping up production and their requirements for coal and other fuels will grow steadily greater. Transportation must be provided this year for 10 percent more coal than was produced in 1950 and freight cars suitable for hauling coal are in short supply and will become more so. The situation is, if anything, more acute with respect to tank cars suited to the transportation of fuel oil and liquefied petroleum gases. Cars of these types are experiencing an increasingly heavy demand in high priority defense activities."

Mohawk Cleaned and Timbered

A review of the past year's operations has been outlined by the Sunny Peak Mining Co. at its Mohawk tunnel property at Conconully, Wash. The company is an outgrowth of the former Glacier Silver-Lead Co., which consolidated seven different groups to open the Lukens-Hazel mine near Libby, Mont.

Preliminary surface work was completed last year. Detailed maps and geological surveys of the claims were made and filed. The Mohawk tunnel, at an elevation of 4256 ft, has been cleaned and retimbered to the ore shoot, and new track laid from the portal for a distance of 450 ft. The Mohawk is a silver mine with copper, lead and other associated minerals.

Dredging Quicksilver

Recovery of quicksilver from tailings at the Enriquita mine on the Guadalupe River near San Jose, Calif., by dredging is projected if tests prove satisfactory.

It is planned to drill huge tailings piles above the Guadalupe reservoir when the river falls to a low stage and work material with a suction dredge. Preliminary arrangements have been made and tests will start as soon as practicable. The Enriquita was a major producer in colonial days and was operated for many years by Spanish interests. Cinnabar was high grade, and much mercury is said to have escaped the crude devices used at the time and indications are that the tailings carry considerable amounts of the metal.

Road Plan Approved

A $10,000,000 construction program to provide access roads to uranium areas in the desert of southeast Utah has gained the approval of the Utah Road Commission. Under the plan, the Federal government will supply 90 percent of the funds needed for the construction.

To Open Manganese Plant

USBM plans to have its manganese pilot plant at Boulder City, Nev., operating by September 1, 1951, it was recently reported in Salt Lake City by J. H. East, Jr., Denver regional director of the Bureau. Mr. East was there to confer with S. R. Zimmerly, chief of the Bureau's metallurgical division for the area, on the final approval of the flow sheet and mill design. The Bureau has secured the steel priority which will assure early completion of the mill, designed to use ore from the Artillery Peak area, 60 miles from Kingman, Ariz. The mine there is now entering operation. However, the mill will also handle ores from other areas. Rex Lloyd, of Boulder City, is in charge of construction of the plant.

Plutonium Power Plant

Dr. C. A. Thomas, vice-president of the Monsanto Chemical Co. has proposed to the government that his company build a $25,000,000 plutonium power plant in the Pocatello, Idaho, region. For several months Monsanto has been considering an electric phosphorous-producing furnace in southeastern Idaho or northern Utah to tap the vast intermountain deposit of phosphate ore.

Limonite Activation

James Orr is operating a pilot plant at Scappoose, Ore., designed to activate limonite used in desulphurizing manufactured gas. The limonite is mined from a deposit located about two miles west of Scappoose. A larger plant is now being built to replace the pilot plant. Grinding equipment and air separators are already in place. When completed the plant will have excess grinding capacity for work other than the limonite activation.

New Aluminum Plant

A new aluminum plant with a 72,000-ton a year capacity is to be started almost at once near Kalispell, Mont. The Department of the Interior has granted a certificate of necessity for the plant to the Harvey Machinery Co. of Torrance, Calif. The site near Kalispell was selected because of the hydroelectric power available when the Hungry Horse Dam is completed.

New Crusher for Pine Creek Mine

United States Vanadium Corp. has completed the installation of a new crushing unit at its Pine Creek tungsten property in the Bishop area of California. The unit will facilitate processing of scheelite and powellite ores from the company's mine and other properties and will handle more than 2000 tons of tailings from the Atolia district. Additional small amounts of tungsten ore will be accepted from producers in eastern California and Nevada. Superintendent H. L. McKinley reports 220 men are employed, the largest number for the past two years and Pine Creek operations are at normal capacity. The improved concentrating plant is reported treating approximately 1500 tons of scheelite daily.

Old Glory Hill Produces Copper

Production of copper ore began recently from the deposit on Old Glory Hill near Kimberly, Nev., owned and worked by Consolidated Coppermines Corp. Approximately 100 men working three shifts are employed in stripping and mining operations at the project, and about 25,000 tons of waste are removed from the open pit daily.

Ore is mined by two power shovels. The deposit contains an estimated 3,000,000 tons of copper ore, according to A. J. O'Connor, general manager of Consolidated Coppermines. The company owns a joint interest in an extension of the great Ruth ore body.

Manufacturers Forum

New Compact Respirator

New Compact Comfo Respirator developed by Mine Safety Appliances Co. provides protection for workers in all industries where toxic or fibrosis-producing dusts are hazards. The

redesigned respirator, which has been approved by the U. S. Bureau of Mines, features a new type mineral wool filter which requires less than half the filter area, offers only half the breathing resistance of previous models with the same dust collecting efficiency, and are reported to be effective as dust collectors under any type of atmospheric condition.

Further information on the new Compact Comfo Respirator is available in Bulletin CR-26, which may be obtained without charge from Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh 8, Pa.

New Padlock Offered

Corbin Cabinet Lock Division, The American Hardware Corp., New Britain, Conn., has announced a new padlock for the protection of boiler-cleaners, electrical repairmen and others whose safety requires that they lock out valves or switches while performing out-of-sight jobs. Special features include 2¾-in. steel shackles and attached metal tags for names or numbers. The padlocks (Model P65R) have 200 possible key changes, or, when desired, can be keyed alike or master-keyed.

45-Lb Track Jack

Templeton, Kenly & Co., Chicago, have introduced a new Simplex single-acting track jack. New, improved features that have been incorporated in the jack design are a low minimum toe height of 2½ in., a trip that can be operated from either the right or left side, and a safety thumb guard to protect the operator. The new jack is 12 in. high, has a lift of 6 in., and a capacity of 15 tons.

New Chain Saw

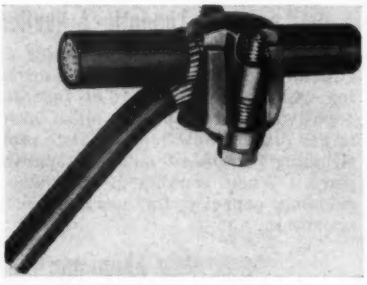
A new 27-lb., 4-hp, gasoline saw is announced by Homelite Corp., Port Chester, N. Y. This new model (26LCS) chain saw attains its fast

cutting speed as a result of two unique features: a narrow-kerf Homelite chain which does less waste cutting, plus an efficient Gilmer belt drive which eliminates drive gears that eat up engine power.

Easy handling on all cuts, filling, backing, undercutting or notching, is facilitated by perfect balance and simple pivot action. The only control is a throttle button on the handle.

Electrical Connectors

O. Z. Electrical Manufacturing Co., Inc., 262 Bond St., Brooklyn, N. Y., has added a new service tap to its line of electrical connectors. The tap is cast of high strength copper alloy and is de-



signed to swivel for easy insertion of conductors.

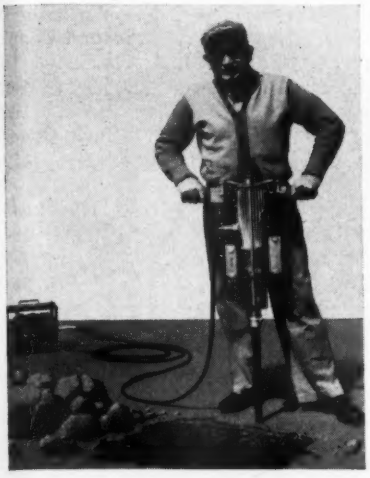
Another feature is the serrations on both body and cap to prevent cables from working loose after tap is installed. Conductors are forced into high pressure contact by means of two hex head cap screws. The tap is for both inside and outside use and smooth, rounded edges permit easy taping. Available in sizes from No. 2 to 1000 Mcm (Main). No. 10 to 1000 Mcm (Tap).

Portable Gasoline Hammer

Introduction of improved models of Barco portable gasoline hammers, featuring new ignition, greater portability and increased operating convenience, is announced by Barco Manufacturing Co., Chicago. The new hammers are distinguished by a simplified arrangement of parts made possible by use of a new and highly compact ignition coil-vibrator-condenser assembly, now located in the right hammer handle. The coil-vibrator-condenser are of sealed type construction, which does not permit field adjustment or unauthorized tampering, and are easily replaceable as units.

Hammers require no auxiliary equipment or power source other than the ignition battery, making them completely portable and suitable for use at any location with but a single

operator. They are air cooled and get their power from a single, two-cycle, full-floating piston. Regular grade motor gasoline, to which lubricating oil is added, is used as fuel. Stand-

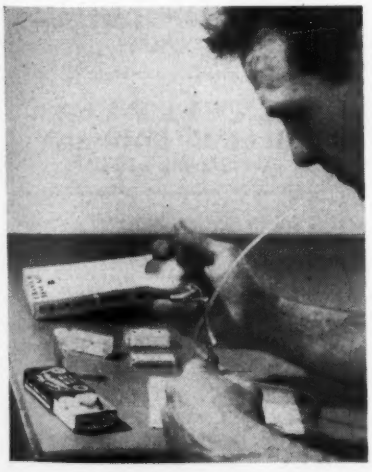


ard models include Model J-2, weighing 72 lb, and heavy duty Model H-6B, weighing 89 lb. Both deliver up to 1550 strokes per minute.

Kits of conversion parts for incorporating latest advanced features into existing hammers are also offered. Complete information about the equipment can be obtained by addressing Barco Manufacturing Co., Dept. J-47, 1801 Winnemac Ave., Chicago 40.

Prospectors' Test Unit

A pocket-size uranium test kit that will enable geologists and prospectors to make quick on-the-spot identifica-



tions of their radioactive ore findings is now being offered by Menlo Research Laboratory of Menlo Park, Calif.

Used in conjunction with any type of ultraviolet (blacklight) instrument, the kit is designed to eliminate the necessity of shipping every radioactive sample to a testing laboratory for determination of uranium presence. Field experience has proved that nearly 50 materials of which uranium is just one are radioactive and will be recorded by such electronic detector instruments as Geiger counters; hence the desirability and economy of making positive supplementary tests.

The complete kit contains packages of testing chemicals, a 2000° F. blowtorch, solid fire tablets, special wires for forming beads, and tongs for holding beads while forming and examining. All elements are replaceable. From 25-30 tests can be made from a single kit.

To test a likely ore at the prospect scene, a chemical bead is formed on a wire and fused with crushed ore particles. Bead then is examined under ultraviolet light.

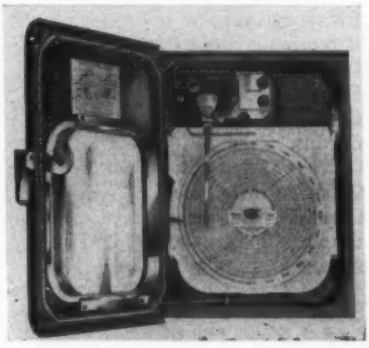
Wagon Drill

A new wagon drill, known as the FM-3, designed to permit unlimited drilling positions of the tower or drill guide, has been announced by Ingersoll-Rand. Flexibility of the unit allows easy drilling in any position encountered in modern rock excavation. The FM-3 mounts the powerful, heavy duty Ingersoll-Rand X-71-WD rock drill as its drilling unit. The unit handles 6-ft steel changes and is good for holes up to 24 ft deep. Bits up to 4-in. gauge can be used. For additional information write Ingersoll-Rand Co., Dept. RD, 11 Broadway, New York 4.

New Recording Voltmeters and Ammeters

A new line of recording voltmeters and ammeters, identified as the "Series 500" Electric Recorders, has just been announced by the Bristol Co., Waterbury 20, Conn. These instruments make a continuous record of voltage or current on an 8-in. circular chart.

The new moving-iron measuring



mechanism produces a high actuating torque at a low electrical burden. The mechanism has shock-protected precision stainless steel bearings, magnetic damping, and a locking device to prevent damage due to rough handling.

Instruments are housed in a compact die-cast aluminum alloy case which is moisture, fume, and dustproof.

Complete information on models, ranges, specifications, and uses are given in 28-page Bulletin E1111, which is available from the company.

— *Announcement* —

Jonathan S. Raymond has been elected a director of the **Joy Mfg. Co.**, to fill the vacancy caused by the resignation of **Alexander B. Royce.**

Charles K. Essex has been named Marion Power Shovel Co. sales representative for a territory covering a large part of northeastern Ohio, three northern Pennsylvania counties and a section of northwestern New York State.

Link Belt Co., recently announced the appointment of **Ralph W. Rausch** as consulting engineer. Rausch's former position as chief engineer of the Pershing Road plant, Chicago, will be filled by **J. J. Richard**, executive assistant chief engineer.

George A. Wampler, former sales representative in **Allis-Chalmers'** Memphis district office, has been named manager of the Chicago warehouse sales unit, a new section set up in the company's Chicago district office to handle the sales of small apparatus. The new unit will be located at 500 East 27th St.

W. W. Black has recently been appointed chief engineer, field engineering section, in **International Harvester's** industrial government products group.

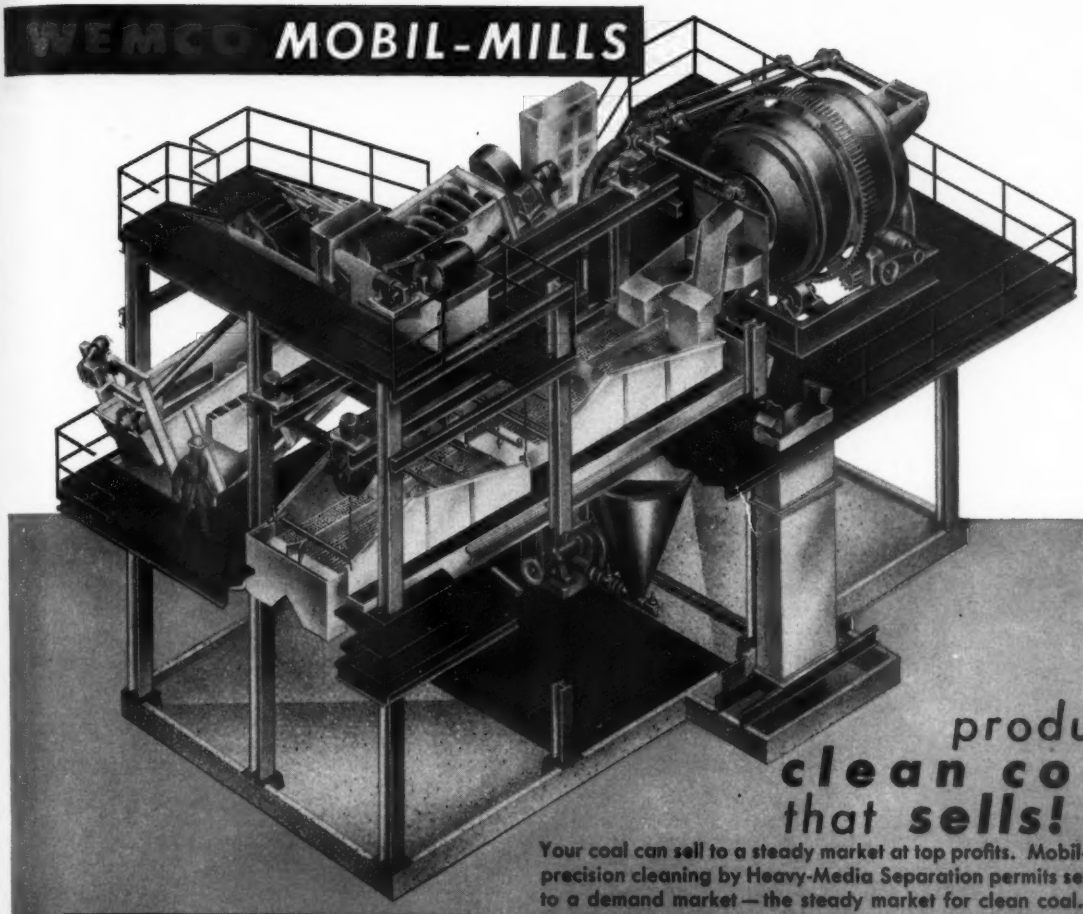
Howard E. Maloney has been appointed manager of sales, electrical wire division of **John A. Roebling's Sons Co.**, Trenton, N. J. **Frank T. Craven** was promoted to assistant manager of sales and **Roy H. Hainsworth** became eastern regional manager, with headquarters in Trenton.

Robert M. Maxwell has been appointed general product manager of the coal chemical sales division, commercial department, **U. S. Steel Co.** Product managers have been named for the various products sold by the coal chemical sales division, i.e., **Walter E. Nordquist**, ammonium sulphate; **Walter A. Jones, Jr.**, tar and tar products; the **Robert W. Walsh**, light oils.

The offices of the coal chemical sales division were moved from New York to Pittsburgh.

Index to Advertisers

WEMCO MOBIL-MILLS



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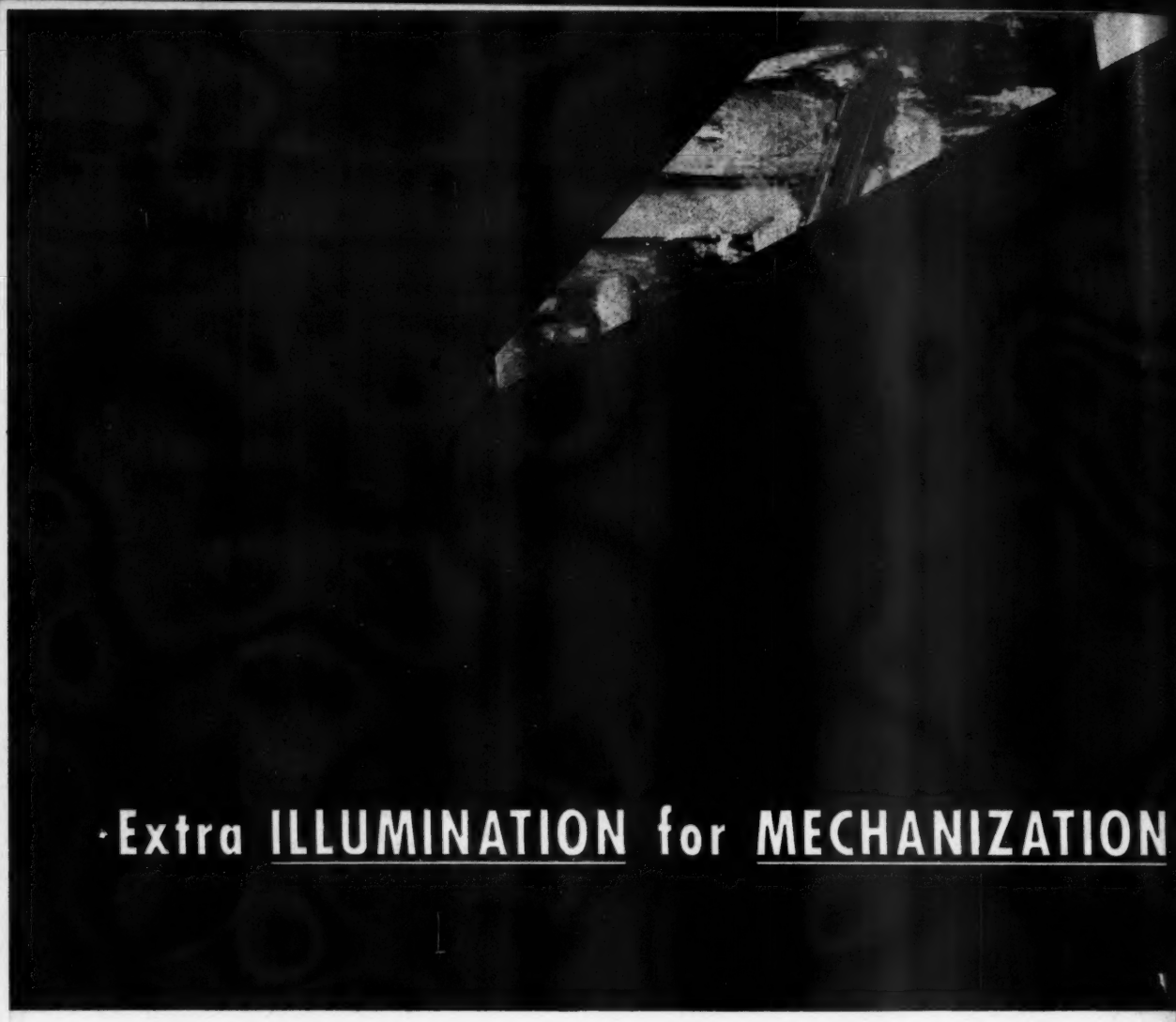

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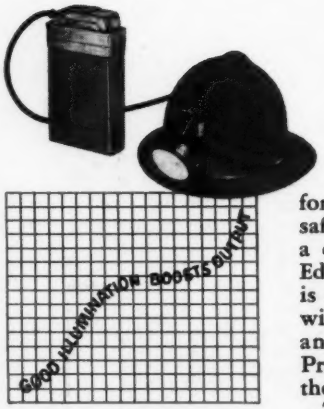

WITH THE M.S.A.

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Write for Bulletin No. M-19 for co details, or let us arrange an actual demo tion in your particular mining operat your convenience.

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